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ACC #1



**NOVEMBER 1991
INVESTIGATION
OF FORMER
UNDERGROUND
SOLVENT PRODUCT
TANKS
FACILITY AT
3200 MAIN STREET
KEOKUK, IOWA**

Prepared for
United Technologies Automotive
Systems, Inc.
Hartford, Connecticut
February 1992

Woodward-Clyde 

Woodward-Clyde Consultants
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Overland Park, Kansas 66203



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MEMORANDUM OF TRANSMITTAL

Date: 2-25-92

To: Ms. Tran N. Tran
USEPA
Region VII

Project Name: S-G RFI

Project Number: 91C7343

File Number:

Subject: Facility at 3200 Main St., Keokuk, IA

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NO. OF ITEMS	DESCRIPTION
2	Nov. 1991 Solvent Product Tanks Groundwater Investigation Report

REMARKS: Tran - These are 2 copies of report that was prepared for IDNR. Call me if you have any questions.

- David

Woodward-Clyde Consultants

By: David A. Dods

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IOWA SECTION

cc:

5055 Antioch Road
Overland Park, Kansas 66203
913-432-4242

Woodward-Clyde Consultants

February 24, 1992
WCC Project 91C7343

Ms. Alesia Whitney-Knight
Iowa Department of Natural Resources
Environmental Protection Division
900 East Grand Avenue
Des Moines, Iowa 50319-0034


Re: Former Sheller-Globe Facility
Keokuk, Iowa

Dear Ms. Whitney-Knight:

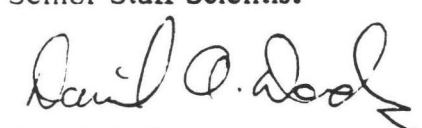
Enclosed for your review is the November 1991 Investigation Report for the former Sheller-Globe facility located at 3200 Main Street, Keokuk, Iowa. Woodward-Clyde Consultants (WCC) is submitting the report on behalf of our client, United Technologies Automotive Systems, Inc. (UTAS). The report presents the results of the field investigation at the location of the former underground solvent product storage tanks conducted in November 1991.

If you have any questions regarding the report, please direct them to Mr. Brian Yeich at UTAS. He can be reached at (203) 728-7622.

Very truly yours,



David L. Kocour
Senior Staff Scientist



David A. Dods
Project Engineer

dlb

917343\RPT\LOT.DLK 02/24/92

Consulting Engineers, Geologists
and Environmental Scientists

Offices in Other Principal Cities

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IOWA SECTION





**NOVEMBER 1991
INVESTIGATION
OF FORMER
UNDERGROUND
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FACILITY AT
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Project Number 91C7343

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INTRODUCTION

This report presents the results of additional groundwater monitoring well installation and groundwater sampling at the Facility located at 3200 Main Street in Keokuk, Iowa. This investigation was conducted as part of an ongoing Site Assessment involving the former underground solvent product tanks removed from the property in October 1989. The ongoing site assessment is being conducted under the guidance and direction of the Iowa Department of Natural Resources (IDNR).

The goals of the November 1991 investigation were to:

- Further evaluate groundwater flow directions and contamination in the native soils underlying and downgradient of the former tank area; and
- Further evaluate the lateral extent of groundwater contamination with particular regard to assessing the potential for off-site migration south of the Employee Parking Lot.

This investigation supplements Woodward-Clyde Consultants' (WCC's) initial Phase III Site Assessment Report dated July 17, 1991. The field investigation was conducted by WCC on behalf of United Technologies Automotive Systems, Inc. (UTAS, formerly known as Sheller-Globe Corporation) during the period of November 5, 1991 through November 20, 1991. Field work was performed in accordance with the procedures and protocols of the Phase III Site Assessment Work Plan dated February 22, 1991, prepared by Pollution Control Systems, Inc. and the UTAS amendment to the Work Plan dated September 20, 1991. Program modifications requested by the Iowa Department of Natural Resources (letter dated July 31, 1991) were also incorporated into the field investigation. The UTAS letter outlining the scope of work and the IDNR response are contained in Appendixes A and B.

The field investigation included the installation of three additional groundwater monitoring wells and the sampling of groundwater from all 16 new and existing monitoring wells. This report describes the investigation activities conducted, presents the results of the investigation, describes the current understanding of site conditions as they relate to the sources and extent of contamination, and makes recommendations for further site assessment activities.

BACKGROUND

Five underground solvent product storage tanks were removed from the southwest portion of the Facility in October 1989. The facility history, tank history, and field investigation results since that time have previously been reported to the Iowa Department of Natural Resources (IDNR) in the following documents:

- Sheller-Globe Corporation, Keokuk Plant, Site Assessment Work Plan, May 3, 1990, prepared by United Technologies Automotive;
- Site Assessment Investigation, Sheller-Globe, 3200 Main Street, Keokuk, Iowa, August 9, 1990, prepared for United Technologies Automotive by Pollution Control Systems, Inc.;
- Phase II Site Assessment Subsurface Investigation, Sheller-Globe Facility, 3200 Main Street, Keokuk, Iowa, January 3, 1991, prepared for Sheller-Globe Corporation by Pollution Control Systems, Inc.; and
- Phase III Site Assessment Report, Former Sheller-Globe Facility, 3200 Main Street, Keokuk, Iowa, July 17, 1991, prepared for Sheller-Globe Corporation by Woodward-Clyde Consultants.

The reader is referred to those documents for details of the site history. Since the tanks were removed in 1989, previous field investigations have included the performance of a soil gas survey, field screening and sampling of shallow soil borings, installation of groundwater monitoring wells in the shallow fill material and in native soils, the performance of hydraulic tests on selected wells, and the sampling of monitoring wells.

Geology in the vicinity of the former tank excavation is generally characterized by a surficial layer of structural fill material overlying glacial till soils. Composition of the structural fill material varies somewhat from location to location across the site, but generally consists of firm to stiff, olive-brown medium plastic silty clay with sand, gravel, brick, and wood fragments.

The glacial till soil beneath the site generally consists of firm to very stiff, yellowish-brown, medium to highly plastic clay with traces of fine to medium sand and fine gravel and some gray mottling. Discontinuous beds or lenses of sand also occur within the till.

The current on-site groundwater monitoring well network consists of 5 shallow monitoring wells screened in the structural fill material and 11 wells screened in the upper portion of the glacial till (Drawing 1). Previous investigations have revealed that at shallow levels in the glacial till, groundwater flow is to the southwest.

This investigation further characterized conditions in the native soils beneath the fill.

INVESTIGATION ACTIVITIES AND METHODS

3.1 INTRODUCTION

All field work was performed in accordance with the procedures and protocols specified in the Phase III Site Assessment Work Plan dated February 22, 1991, prepared by Pollution Control Systems, Inc., as amended by a letter dated September 20, 1991, prepared by Mr. Brian Yeich of UTAS (Appendix A). The scope of work incorporated comments received from the Iowa Department of Natural Resources (Appendix B).

3.2 FIELD INVESTIGATION

Field work for this investigation was performed between November 5 and November 20, 1991. All drilling activities were performed by Winnek, Inc. of Tulsa, Oklahoma under the direction of the WCC field geologist. Groundwater samples were analyzed by Enseco-Rocky Mountain Analytical Laboratories in Arvada, Colorado. In accordance with the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR 1910, a site-specific Health and Safety Plan was prepared by WCC and implemented during all phases of the field investigation.

3.3.1 Monitoring Well Installation

In order to further evaluate the horizontal extent of contamination in the glacial till soils, three new groundwater monitoring wells were installed in the locations shown on Drawing 1. The Phase III Site Assessment Report recommended the installation of two additional monitoring wells downgradient of the tank excavation and MW-10. Well MW-13 was installed immediately downgradient (approximately southwest) of existing well MW-10. Well MW-14 was installed further downgradient at the facility property line on the south edge of the Employee Parking Lot. In addition, the comment letter from the IDNR dated July 31, 1991 requested a third new monitoring well downgradient of the approximate location of the former chemical storage and mixing building. Well MW-15 was installed at that location. Well locations are shown on Drawing 1.

The construction details for the new and existing monitoring wells are summarized on Table 1 and the boring logs are presented in Appendix C.

The monitoring wells were installed in general accordance with the procedures and protocols specified in Pollution Control Systems (PCS) Phase III Site Assessment Work Plan (dated February 22, 1991) and the letter to the IDNR from Mr. Brian Yeich dated September 20, 1991.

Borings for the monitoring wells were drilled with a Mobile B-61 auger rig using 4 1/4-inch I.D. (8.5-inch O.D.) hollow-stem augers. The borings for MW-14 and 15 were drilled to a total depth of 34 feet and were continuously sampled with a 5-foot core barrel sampler. The boring for MW-13 was continuously sampled to a depth of 29 feet. Soil samples from the borings were visually classified and logged by the WCC geologist.

The three wells were constructed of 2-inch diameter, flush-coupled, Schedule 40 PVC pipe with 10-foot sections of 0.010-inch commercially slotted, flush-coupled Schedule 40 PVC screen. All wells were constructed in accordance with the work plan.

Following installation, the three monitoring wells were developed to increase yield and to remove any materials which may have been introduced during drilling operations. The 3 wells were developed by removing a minimum of 10 well volumes of water with disposable polyethylene bailers. In addition, water quality parameters including temperature, pH, salinity, and conductivity were measured during development. The water generated during development was stored on site for future evaluation and disposal.

3.3.2 Groundwater Sampling

Sampling and analysis activities were conducted in general accordance with the procedures and protocols specified in the Phase III Work Plan and the UTAS amendment letter.

Groundwater samples were collected from the 3 new monitoring wells and the 13 existing wells. Water levels were measured on November 19, 1991 and are summarized in Table 1. Twelve of the 16 wells were purged on November 19, 1991 with the remaining 4 wells (MW-7, 8, 9, and 12) purged on the morning of November 20, 1991. Samples were collected from each well on November 20, 1991, utilizing disposable polyethylene bailers. Samples collected from each well were put into three 40-ml glass vials and placed in a cooler with ice. Water quality parameters were also measured in the field and included pH, temperature, and conductivity. Due to a malfunctioning meter, pH was not measured from all wells. In addition, samples collected from MW-2, 5, 6A, 12, 13, 14, and 15 were split with Iowa Department of Natural Resources officials.

Quality assurance samples, including a trip blank and two duplicate samples from MW-10 and 12 (labeled MW-10D and MW-12D), were collected and submitted to the laboratory.

All groundwater samples were analyzed by Enseco-Rocky Mountain Analytical Laboratories for volatile organic compounds by EPA SW-846 Method 8240. The analytes included the Superfund Contract Laboratory Program (CLP) Target Compound List (TCL) volatiles, plus methyl isobutyl ketone, n-hexane, and butanol.

4.1 SITE HYDROGEOLOGY

Water levels in the on-site monitoring wells were measured on November 19, 1991 and are summarized in Table 1. Water levels from the 11 monitoring wells screened in the upper portion of the glacial till were used to construct the water level contour map presented in Drawing 2. The map generally supports the results from previous investigations. Groundwater flow, at shallow levels in the glacial till, is generally to the southwest. In addition, as reported in the July 17, 1991, Phase III Site Assessment Report, based on the water level measurements in the 5 shallow wells screened in the fill material, a zone of perched groundwater exists in the fill material in the vicinity of the former tank excavation. The fill material is likely recharged through openings in the asphalt and concrete parking lot. These openings include gravel backfill in the former tank excavation, cracks in the parking lot, and gravel around the railroad tracks.

Chemical data collected during the course of this investigation supports the hypothesis that reinforced concrete (RCP) and corrugated metal pipes (CMP) located south and west of the former excavation may be influencing shallow groundwater flow in the fill and tills. There are insufficient water level data to construct a water level contour map which clearly reflects flow to those storm sewer pipes. However, the greater water level decline between May and November 1991 in MW-10 (1.6 feet) than in the nearby MW-6B, 7, 9, and 11 wells (0.7 feet to 0.9 feet) also suggests the 24-inch CMP might be a groundwater conduit. Contaminant concentrations in the vicinity of the pipelines are discussed in the following section.

4.2 GROUNDWATER SAMPLE RESULTS

Groundwater samples were collected from the 3 newly installed wells and from the 13 existing wells. All samples were analyzed using EPA Method 8240 for volatile organic compounds. As previously stated, samples obtained from wells MW-2, 5, 6A, 12, 13, 14, and 15 were split with officials from the Iowa Department of Natural

Resources. Preliminary review of the IDNR results showed general comparability to the results discussed herein. The analytical results of WCC's groundwater samples are summarized in Table 2.

Analytical results of selected organic compounds have been plotted on the site map in Drawings 3, 4, 5, 6, and 7. The distribution of total volatile organic compounds in the monitoring wells is shown on Drawing 8. Table 2 and Drawings 3 through 8 present the best overview of the distribution of specific contaminants in site wells. This section presents a summary of the general distribution patterns of the solvents.

Results of this sampling event are similar in many respects to those obtained in the July 1991 sampling event. The volatile organic compounds detected in the highest concentrations were toluene, xylene, and methylene chloride. Concentrations of toluene and methylene chloride were highest in the two monitoring wells screened in the fill material immediately adjacent to the former tank excavation (MW-1 and MW-2). Concentrations for individual analytes in MW-1 and MW-2 ranged from 3,300 to 410,000 $\mu\text{g/L}$. Concentrations tend to decrease dramatically away from the former tank excavation particularly to the north and west.

Analytical data from well MW-6A continues to suggest a secondary source area of contamination in the vicinity of that well. The total solvent concentration in the well was 96,970 $\mu\text{g/L}$. Major contaminants in MW-6A were toluene (18,000 $\mu\text{g/L}$), ethylbenzene (19,000 $\mu\text{g/L}$), and xylene (57,000 $\mu\text{g/L}$).

A variety of chlorinated solvents are widely distributed in the wells, typically occurring at concentrations one or more orders of magnitude lower than toluene, methylene chloride, and xylene. The primary source of the chlorinated solvents is probably one of the former underground product storage tanks. One tank previously contained "Head Flush Solvent" which reportedly consisted of methylene chloride, trichloroethylene, 1,1,1-trichloroethane, butanol, and ethanol.

Four compounds were identified in the sample from upgradient well MW-12. These included methylene chloride, toluene, hexane, and acetone, all at concentrations at, or less than, 4.2 $\mu\text{g/L}$. Methylene chloride, acetone, and hexane were also found in the laboratory method blanks at similar concentrations.

Similar results were reported in the samples from the downgradient property line well MW-14 and the trip blank. Low levels of methylene chloride and acetone were reported in both samples. Hexane was also reported in the trip blank. All three of these compounds were reported in the laboratory method blanks at similar concentrations, suggesting that MW-14 and the trip blank were not contaminated.

Wells MW-10 and MW-13 exhibit solvent concentrations significantly higher than those in other till wells. In addition, total solvent concentrations are almost six times higher in MW-13 (107,260 $\mu\text{g/L}$) than MW-10 (18,230 $\mu\text{g/L}$), although MW-13 is further downgradient. At first inspection, these results appear contradictory; however, the following hypothesis is a possible explanation and supports our recommendations for proposed additional work (Section 6.0).

The structural fill material between the Chemical Storage Building and the vicinity of well MW-6A remains a significant source area of volatile organic contaminants. This fill material consists of soil, rock, and debris. The till underlying the fill material is composed primarily of medium to highly plastic clays. In this region, clay tills often exhibit some degree of fracturing in their upper portions. Typically, these fractures are tight and decrease in frequency with depth. Solvent migration in the upper tills underlying the fill material is probably controlled by this type of fracturing.

The solvent concentrations in wells MW-10 and MW-13 may be explained by the distribution of fill materials at the site. Solvents are believed to be migrating both laterally and downward through the fill materials. Near well MW-10, fill material was encountered to a depth of approximately 8 feet and the well was screened from a depth of 19.4 to 29.4 feet below grade. The top of the well screen is over 11 feet below the fill material.

At well MW-13, fill material was encountered to a depth of 11 feet and the well screen begins at a depth of 17.4 feet. In this case, the well screen is only about 6 ½ feet below the fill. The fact that MW-13 is screened about 5 feet closer to the bottom of the fill material than MW-10 may explain the higher solvent concentrations found in that well. Moreover, the results from MW-13 may not be representative of solvent concentrations only 5 to 10 feet deeper in the till at that location. In other words, the results in MW-13 are higher relative to other till wells due probably to the proximity of the fill material to the screened interval.

5.0

CONCLUSIONS

This portion of the Site Assessment included the installation of three monitoring wells into the native soils, and the sampling of groundwater from all new and existing monitoring wells. The key findings of the field investigation are described below:

In comparison with groundwater analytical results obtained from the July 1991 sampling event, total solvent concentrations in existing groundwater monitoring wells have decreased slightly, but follow similar distribution patterns.

Two primary VOC contaminant source areas exist in the fill material. The first is the area around the former tank excavation. The second is in the vicinity of well MW-6A.

Solvent migration from the source area(s) appears to be influenced by the thickness and heterogeneity of the fill above the till and configuration of the till surface. Solvent contamination in till wells is influenced by the aforementioned factors, the depth below overlying fill materials, and the lateral distance from contaminant source areas. In addition, the storm sewer pipes in the area, or the backfill around them, may serve as an additional solvent migration pathway.

Analytical groundwater results obtained from a monitoring well (MW-14) located downgradient from the former excavation and along the south property boundary did not reveal any evidence of off-site contaminant migration.

Finally, analytical groundwater results obtained from monitoring wells MW-11 and MW-15 located downgradient from the secondary contaminant source area in the vicinity of MW-6A did not reveal any evidence of significant contaminant migration from that area, relative to the concentrations present downgradient of the former tank excavation.

6.0

RECOMMENDATIONS

Based on the results of this investigation, additional field work should be conducted to further delineate the lateral extent of groundwater contamination and test the hypothesis that solvent migration is primarily through the fill material.

The recommended investigation includes the following elements:

- Six new monitoring wells (two fill wells and four till wells); and
- Three shallow soil borings.

Proposed well and boring locations are shown on Drawing 9; each item is described below.

It is postulated that solvents from the former tank area are migrating primarily through the fill materials, traveling along the top of the till and possibly also along the storm sewer pipeline backfill material. It is also believed that the levels of contamination in till well MW-13 results from both its downgradient location from the primary source area and its shallow depth beneath the overlying fill material. Two new wells are proposed to test this theory. Proposed well MW-13A will be located adjacent to MW-13 and will be screened in the fill material with the bottom of the well resting on the till surface. Proposed well MW-13B will also be placed nearby but will be screened about 20 feet deeper than MW-13 (Drawing 10). These wells will provide data on contaminants in the fill, in the upper reaches of the till, and deeper into the till.

Proposed well MW-16 will be located downgradient of well MW-13 on the southwest side of the main storm sewer line. The purpose of this well is to help define the lateral extent of contamination and evaluate the influence of the 36-inch storm sewer line on groundwater flow.

Proposed wells MW-17A and MW-17B are placed to evaluate groundwater flow toward the cooling pond. If fill material is present, MW-17A will be screened in the fill and MW-17B in the till below it. If the fill thickness at this location is less than 8 feet, only one well will be placed at this location.

Proposed well MW-18 is placed downgradient of well MW-11 and will help evaluate the effect of the 36-inch storm sewer pipeline on groundwater flow directions.

The three shallow soil borings will be used to evaluate whether solvents are migrating preferentially along backfill materials. Boring WCS-10 is located behind a retaining wall that is reportedly backfilled with sand. This sand may provide a migration pathway from the structural fill material to the storm sewer line backfill. Borings WCS-11 and WCS-12 will be placed adjacent to the primary storm sewer lines. At each location, the borings will be advanced 5 to 10 feet into the backfill surrounding the storm sewer lines. Soil cuttings will be field-screened with an HNu for solvents and a soil sample may optionally be collected from each boring.

In addition, all new monitoring wells and the following existing monitoring wells will again be sampled for volatile organics by Method 8240: MW-10, MW-11, MW-13, and MW-14. These wells were chosen so that the investigation will focus on 1) the solvent contaminants migrating downgradient from the source areas, and 2) the postulated preferential route of contaminant transport through the subsurface materials.

All new borings will be advanced, wells installed, and samples collected, in accordance with the procedures and protocol specified in the Phase III Work Plan and UTAS amendment letter. All new wells will be surveyed relative to the existing wells. Water levels will be measured in all existing and new wells at the time of sampling. A data report will be prepared from this investigation.

The approximate screened intervals of the new wells are estimated as follows:

Well Number	Well Screened in Fill or Till	Approximate Screen Interval (Feet Below Ground Surface)
MW-13A	Fill	6 - 11
MW-13B	Till	40 - 50
MW-16	Till	25 - 35
MW-17A	Fill	5 - 10
MW-17B	Till	25 - 35
MW-18	Till	25 - 35

TABLES

TABLE 1

SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS AND WATER LEVELS

Well I.D.	Date Installed	Elevation of Top of PVC Casing ¹ (feet)	Elevation of Ground Surface (feet)	PVC Casing Diameter (inches)	Total Depth ² (feet)	Screened Interval Elevation (feet)	Depth of Groundwater ³ (feet)	Groundwater Elevation
MW-1	October 1989	640.94	NA	4	14.21	625.94 - 635.94	4.44	636.50
MW-2	October 1989	640.34	NA	4	12.75	627.24 - 637.24	6.66	633.68
MW-3	October 1989	639.02	NA	4	16.77	622.32 - 632.32	11.89	627.13
MW-4	October 1989	640.94	NA	4	11.92	625.94 - 635.94	4.30	636.64
MW-5	November 1990	640.74	640.98	4	30.00	610.71 - 620.71	7.77	632.97
MW-6A	November 1990	641.13	641.43	2	13.94	627.26 - 637.26	7.11	634.02
MW-6B	November 1990	641.00	641.35	2	31.75	609.27 - 619.27	7.46	633.54
MW-7	November 1990	638.48	638.69	2	39.88	598.68 - 608.68	11.00	627.48
MW-8	November 1990	641.69	642.00	2	29.88	611.89 - 621.89	6.75	634.94
MW-9	May 1991	639.02	639.20	2	33.58	604.78 - 614.78	15.11	623.91
MW-10	May 1991	623.98	624.21	4	29.69	594.79 - 604.79	2.14	621.84
MW-11	May 1991	627.06	627.27	2	34.31	592.85 - 602.85	5.33	621.73
MW-12	May 1991	643.40	643.66	2	34.74	609.24 - 619.24	7.96	635.44
MW-13	November 1991	623.23	623.53	2	30.48	596.13 - 606.13	2.83	620.40
MW-14	November 1991	628.24	629.14	2	32.70	596.74 - 606.74	11.31	616.93
MW-15	November 1991	629.11	629.81	2	33.12	597.41 - 607.41	3.89	625.22

Notes:

- 1 All elevations are in feet above mean sea level.
 2 Total depths measured from top of PVC casing on May 30, 1991 and November 5, 1991.
 3 Depth to groundwater measured from top of PVC casing on November 20, 1991.
 NA = Data not available.

TABLE 2

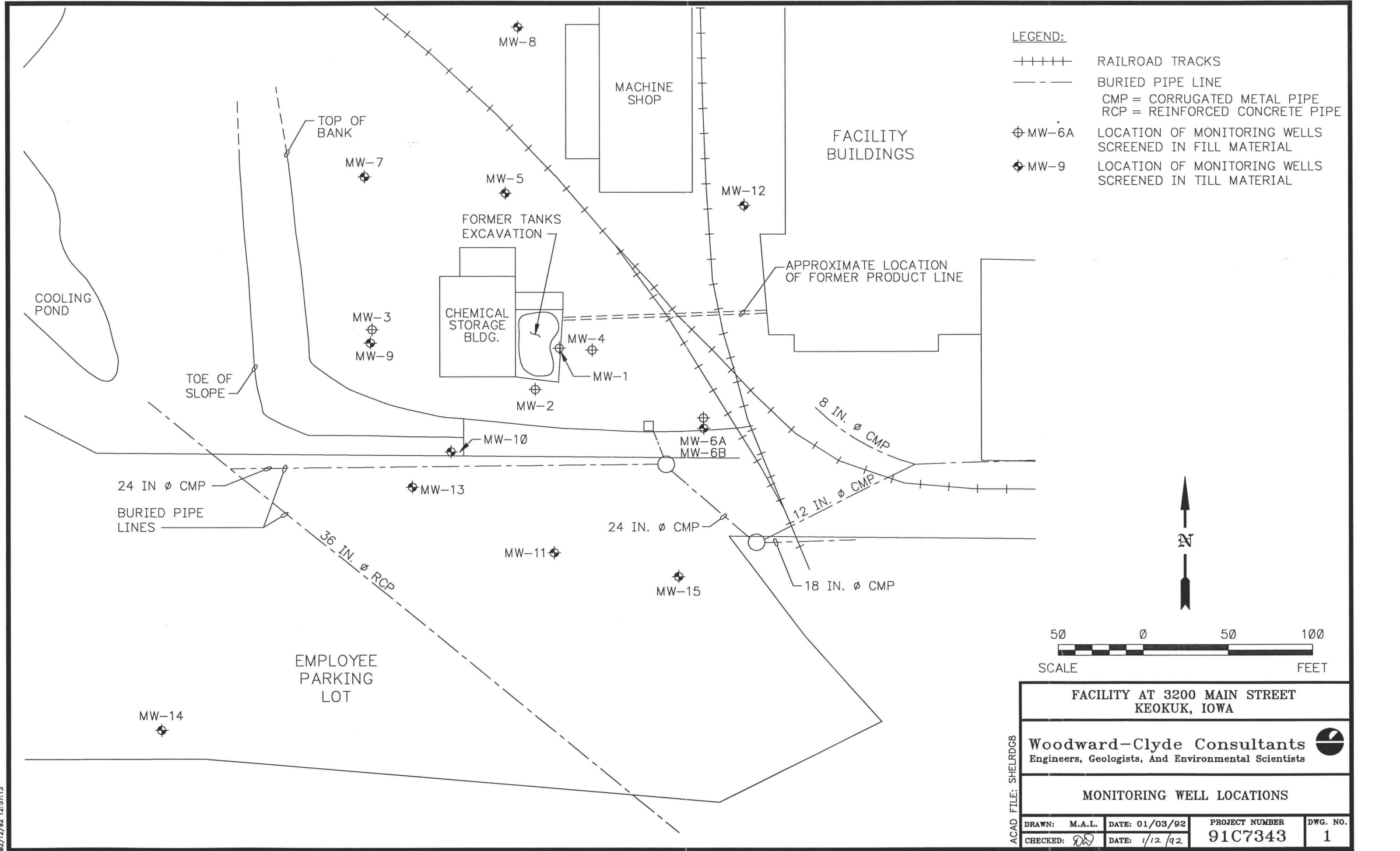
SUMMARY OF ANALYTICAL RESULTS, NOVEMBER 1991, GROUNDWATER SAMPLES
(CONCENTRATIONS IN µg/L)

Compound	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6A	MW-6B	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15
Methylene Chloride	13,000J	23,000	4.3J	24J	1.1J	850J	3.2J	2.7J	4.0J	2.5J	11,000	2.6J	2.8J	55,000	3.0J	3.0J
Toluene	410,000	410,000	170	770	ND(50)	18,000	3.4J	ND(5.0)	ND(12)	ND(5.0)	1,000	ND(5.0)	3.9J	31,000	ND(5.0)	ND(5.0)
Hexane	3,300	4,600	--	13	1.5	440	1.3	1.2	--	2.7	220J	2.3	2.3	880	2.2	2.0
Acetone	ND(3,300)	12,000J	33	220	ND(10)	1,500J	69	3.0J	ND(25)	3.6J	450J	4.7J	4.2J	3,200J	ND(10)	5.6J
2-Butanone (MEK)	ND(33,000)	ND(33,000)	7.5J	ND(100)	ND(10)	ND(2,500)	25	ND(10)	ND(25)	ND(10)	ND(1,000)	ND(10)	ND(10)	1,600	ND(10)	ND(10)
Benzene	ND(17,000)	ND(17,000)	ND(10)	ND(50)	1.6J	ND(1,200)	ND(5.0)	ND(5.0)	ND(12)	ND(5.0)	ND(500)	ND(5.0)	ND(5.0)	ND(2,500)	ND(5.0)	ND(5.0)
Chlorobenzene	ND(17,000)	ND(17,000)	ND(10)	ND(50)	2.6J	ND(1,200)	ND(5.0)	ND(5.0)	ND(12)	ND(5.0)	ND(500)	ND(5.0)	ND(5.0)	ND(2,500)	ND(5.0)	ND(5.0)
1,2-Dichloroethene (Total)	ND(17,000)	ND(17,000)	ND(10)	ND(50)	3.1J	ND(1,200)	5.7	16	75	ND(5.0)	110J	6.4	ND(5.0)	780J	ND(5.0)	14
Tetrachloroethene	ND(1,700)	ND(17,000)	ND(10)	ND(50)	1.0J	ND(1,200)	ND(5.0)	2.2J	86	ND(5.0)	810	ND(5.0)	ND(5.0)	2,100J	ND(5.0)	ND(5.0)
1,2-Dichloroethane	ND(17,000)	ND(17,000)	ND(10)	ND(50)	45	ND(1,200)	ND(5.0)	ND(5.0)	ND(12)	ND(5.0)	ND(500)	ND(5.0)	ND(5.0)	ND(2,500)	ND(5.0)	ND(5.0)
Trichloroethene	ND(7,000)	ND(17,000)	ND(10)	ND(50)	26	ND(1,200)	3.8J	8.5	84	ND(5.0)	2,000	3.2J	ND(5.0)	5,500	ND(5.0)	8.4
Ethylbenzene	ND(17,000)	ND(17,000)	ND(10)	ND(50)	ND(5.0)	19,000	4.6J	ND(5.0)	ND(12)	ND(5.0)	140J	ND(5.0)	ND(5.0)	1,200J	ND(5.0)	ND(5.0)
Xylenes (Total)	ND(17,000)	ND(17,000)	ND(10)	ND(50)	ND(5.0)	57,000	66	ND(5.0)	ND(12)	ND(5.0)	360J	ND(5.0)	ND(5.0)	2,700	ND(5.0)	ND(5.0)
Carbon Disulfide	ND(17,000)	ND(17,000)	ND(10)	ND(50)	ND(5.0)	ND(1,200)	4.0J	16	ND(12)	1.8J	ND(500)	ND(5.0)	ND(5.0)	ND(2,500)	ND(5.0)	ND(5.0)
1,1-Dichloroethane	ND(17,000)	ND(17,000)	ND(10)	ND(50)	ND(5.0)	ND(1,200)	2.1J	ND(5.0)	ND(12)	1.3J	ND(500)	ND(5.0)	ND(5.0)	ND(2,500)	ND(5.0)	1.1J
Vinyl Chloride	ND(33,000)	ND(33,000)	ND(20)	ND(100)	ND(10)	ND(2,500)	ND(10)	4.1J	ND(25)	ND(10)	ND(1,000)	ND(10)	ND(10)	ND(5,000)	ND(10)	ND(10)
Carbon Tetrachloride	ND(17,000)	ND(17,000)	ND(10)	ND(50)	ND(5.0)	ND(1,200)	ND(5.0)	ND(5.0)	43	ND(5.0)	ND(500)	ND(5.0)	ND(5.0)	ND(2,500)	ND(5.0)	3.4J
Chloroform	ND(17,000)	ND(17,000)	ND(10)	ND(50)	ND(5.0)	ND(1,200)	ND(5.0)	ND(5.0)	9.8J	ND(5.0)	ND(500)	ND(5.0)	ND(5.0)	ND(2,500)	ND(5.0)	7.9
1,1-Dichloroethene	ND(17,000)	ND(17,000)	ND(10)	ND(50)	ND(5.0)	ND(1,200)	ND(5.0)	ND(5.0)	ND(12)	ND(5.0)	540	ND(5.0)	ND(5.0)	1,200J	ND(5.0)	ND(5.0)
1,1,1-Trichloroethane	ND(17,000)	ND(17,000)	ND(10)	ND(50)	ND(5.0)	ND(1,200)	ND(5.0)	ND(5.0)	ND(12)	ND(5.0)	1,600	ND(5.0)	ND(5.0)	2,100J	ND(5.0)	ND(5.0)
Total Volatile Organic Compounds	426,300	449,600	214.8	1,027	81.9	96,790	188.1	53.7	301.8	11.9	18,230	19.2	13.2	107,260	5.2	45.4

Notes:

ND = Not detected (detection limit).
J = Result is detected below the reporting limit or is an estimated concentration.
Compounds listed are ones which were detected during the sampling event. For a complete list of analytes, see Appendix F.
All samples collected on November 20, 1991.
Acetone, methylene chloride, and hexane were detected in laboratory method blanks at total concentrations ranging from 1.3 to 11.4µg/L.

DRAWINGS



FACILITY AT 3200 MAIN STREET
KEOKUK, IOWA

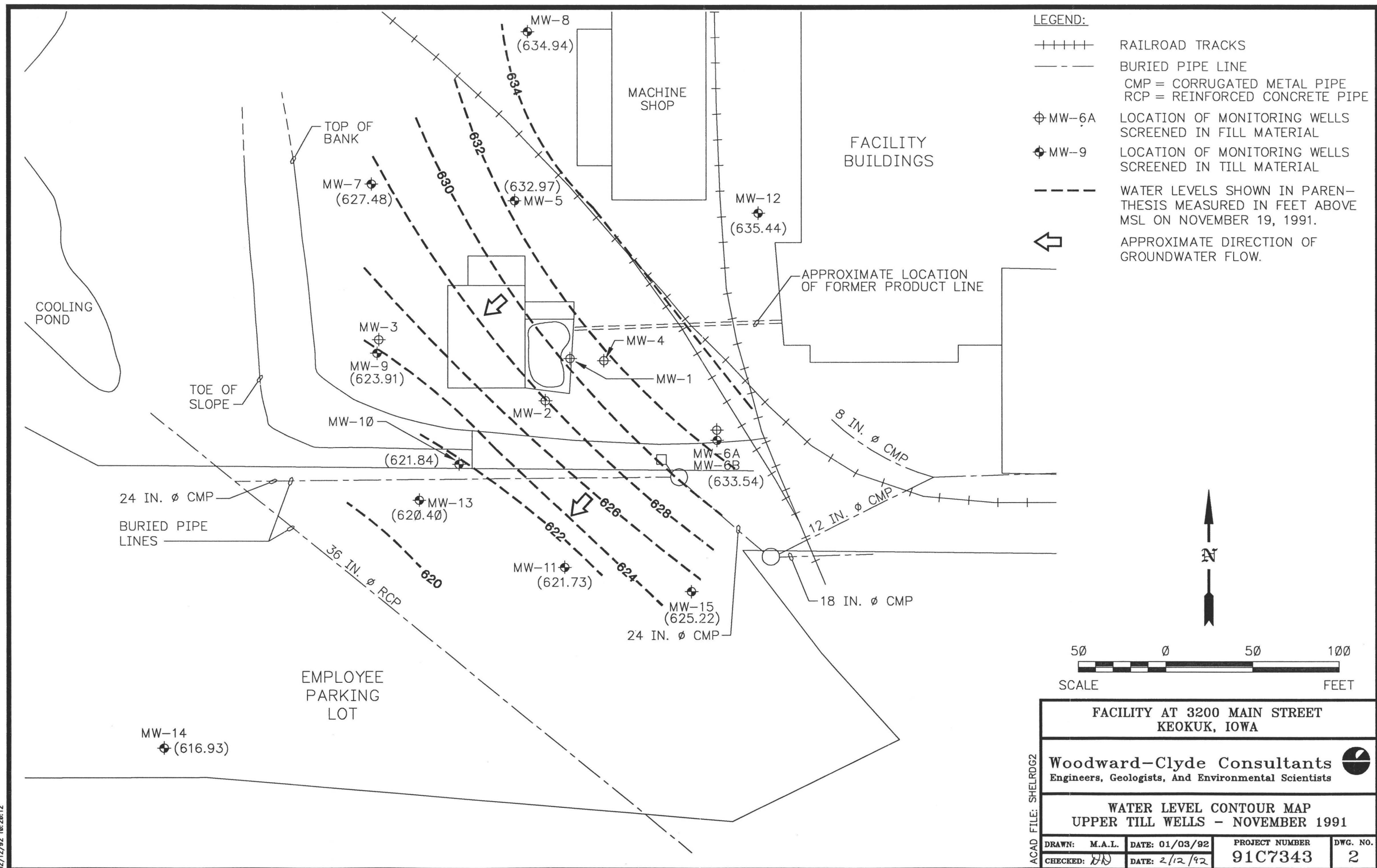
Woodward-Clyde Consultants
Engineers, Geologists, And Environmental Scientists

MONITORING WELL LOCATIONS

DRAWN: M.A.L.	DATE: 01/03/92	PROJECT NUMBER	DWG. NO.
CHECKED: <i>W</i>	DATE: 1/12/92	91C7343	1

02/12/92 12:57:13

02/12/92 10:28:12



- LEGEND:
- +++++ RAILROAD TRACKS
 - BURIED PIPE LINE
 - CMP = CORRUGATED METAL PIPE
 - RCP = REINFORCED CONCRETE PIPE
 - ⊕ MW-6A LOCATION OF MONITORING WELLS SCREENED IN FILL MATERIAL
 - ⊕ MW-9 LOCATION OF MONITORING WELLS SCREENED IN TILL MATERIAL
 - WATER LEVELS SHOWN IN PARENTHESIS MEASURED IN FEET ABOVE MSL ON NOVEMBER 19, 1991.
 - ← APPROXIMATE DIRECTION OF GROUNDWATER FLOW.

N

500

0

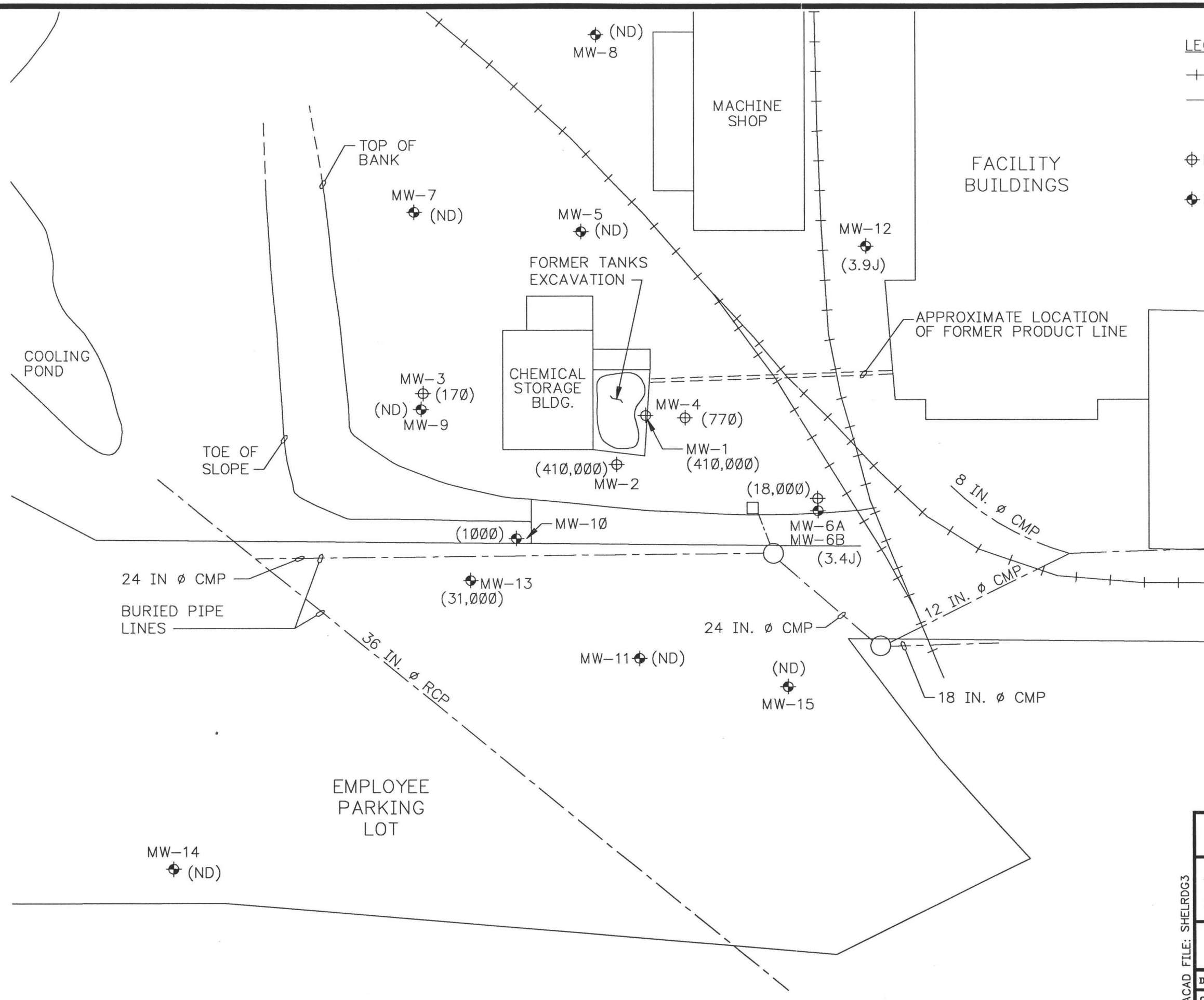
50

100

SCALE FEET

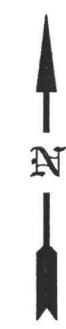
FACILITY AT 3200 MAIN STREET KEOKUK, IOWA			
Woodward-Clyde Consultants Engineers, Geologists, And Environmental Scientists			
WATER LEVEL CONTOUR MAP UPPER TILL WELLS - NOVEMBER 1991			
DRAWN: M.A.L.	DATE: 01/03/92	PROJECT NUMBER	DWG. NO.
CHECKED: DD	DATE: 2/12/92	91C7343	2

ACAD FILE: SHELROG2



- LEGEND:
- ++++ RAILROAD TRACKS
 - BURIED PIPE LINE
 - CMP = CORRUGATED METAL PIPE
 - RCP = REINFORCED CONCRETE PIPE
 - ⊕ MW-6A LOCATION OF MONITORING WELLS SCREENED IN FILL MATERIAL
 - ⊕ MW-9 LOCATION OF MONITORING WELLS SCREENED IN TILL MATERIAL

VALUE IN PARENTHESIS REPRESENTS THE CONCENTRATION OF DETECTED TOLUENE IN ug/L. ALL SAMPLES WERE COLLECTED ON NOVEMBER 20, 1991.



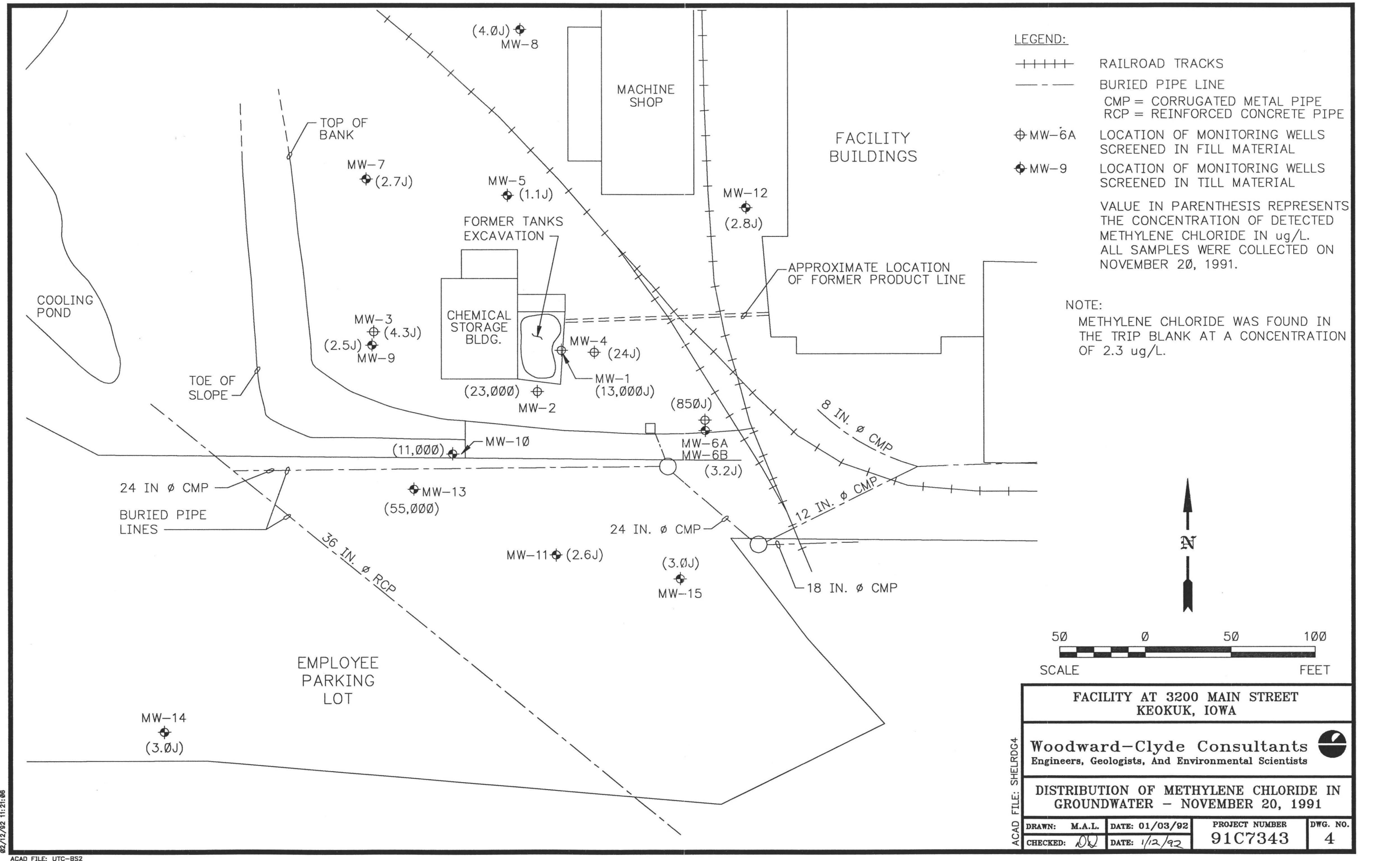
FACILITY AT 3200 MAIN STREET
KEOKUK, IOWA

Woodward-Clyde Consultants
Engineers, Geologists, And Environmental Scientists

**DISTRIBUTION OF TOLUENE IN
GROUNDWATER - NOVEMBER 20, 1991**

DRAWN: M.A.L.	DATE: 01/03/92	PROJECT NUMBER	DWG. NO.
CHECKED: QQ	DATE: 1/12/92	91C7343	3

02/12/92 11:17:48

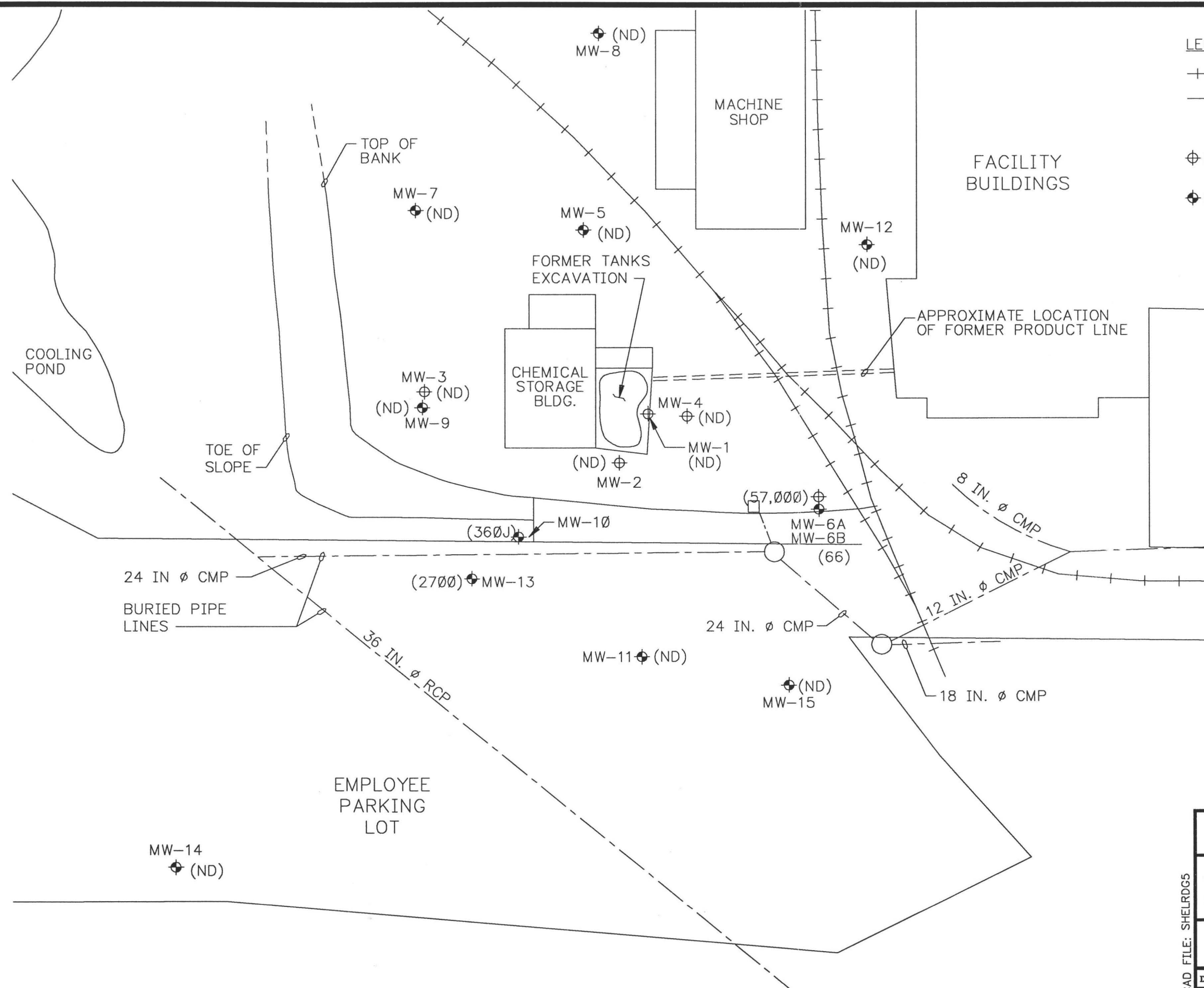


FACILITY AT 3200 MAIN STREET
KEOKUK, IOWA

Woodward-Clyde Consultants
Engineers, Geologists, And Environmental Scientists

**DISTRIBUTION OF METHYLENE CHLORIDE IN
GROUNDWATER - NOVEMBER 20, 1991**

DRAWN: M.A.L.	DATE: 01/03/92	PROJECT NUMBER	DWG. NO.
CHECKED: <i>OK</i>	DATE: 1/2/92	91C7343	4



LEGEND:

- ++++ RAILROAD TRACKS
- BURIED PIPE LINE
- CMP = CORRUGATED METAL PIPE
- RCP = REINFORCED CONCRETE PIPE
- ⊕ MW-6A LOCATION OF MONITORING WELLS SCREENED IN FILL MATERIAL
- ⊕ MW-9 LOCATION OF MONITORING WELLS SCREENED IN TILL MATERIAL

VALUE IN PARENTHESIS REPRESENTS THE CONCENTRATION OF DETECTED XYLENES (TOTAL) IN ug/L. ALL SAMPLES WERE COLLECTED ON NOVEMBER 20, 1991.



FACILITY AT 3200 MAIN STREET
KEOKUK, IOWA

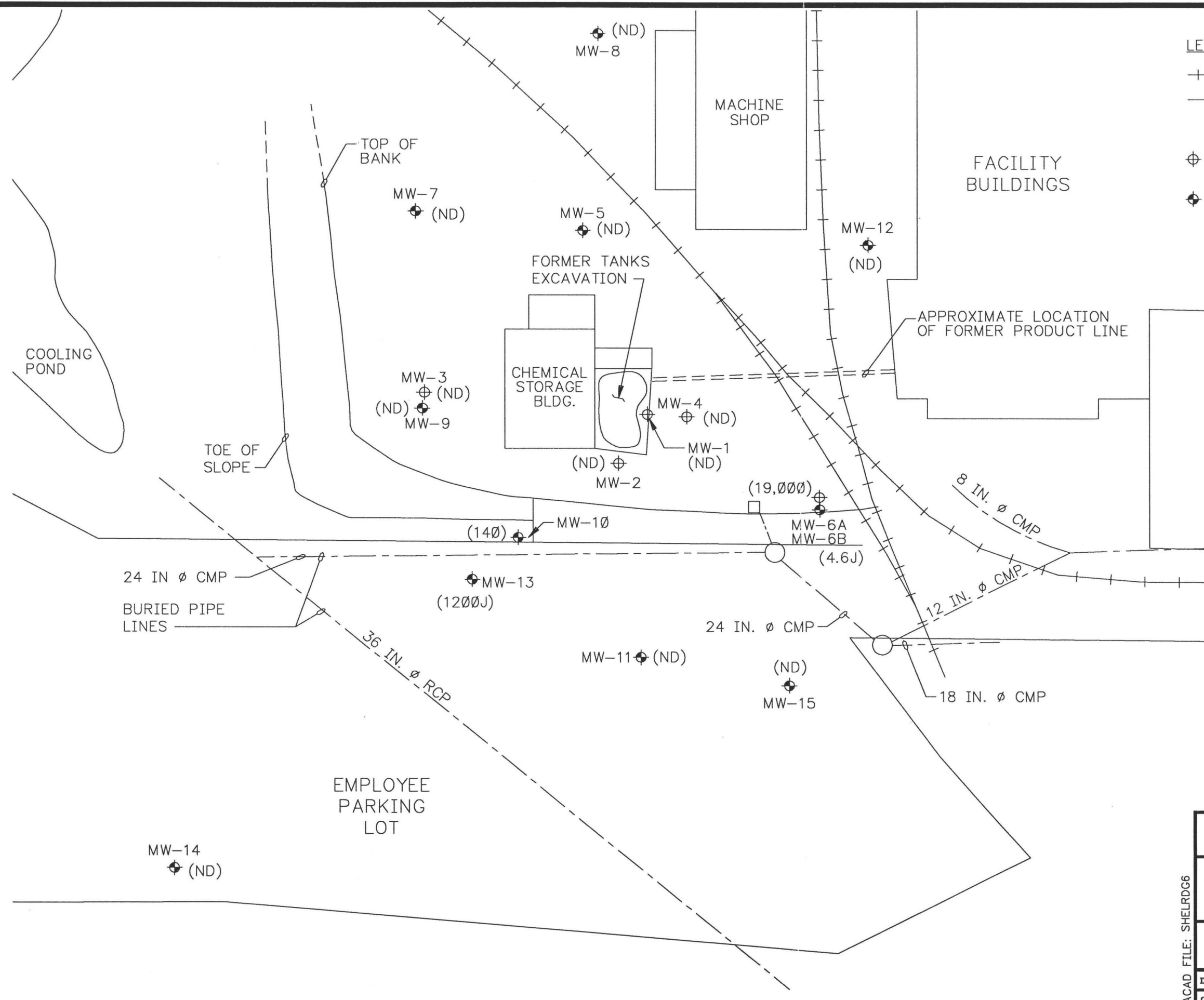
Woodward-Clyde Consultants
Engineers, Geologists, And Environmental Scientists

DISTRIBUTION OF XYLENES (TOTAL) IN
GROUNDWATER - NOVEMBER 20, 1991

DRAWN: M.A.L.	DATE: 01/03/92	PROJECT NUMBER	DWG. NO.
CHECKED: <i>DD</i>	DATE: 1/12/92	91C7343	5

ACAD FILE: SHELDRGS

02/12/92 11:23:56



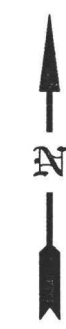
LEGEND:

+++++ RAILROAD TRACKS
--- BURIED PIPE LINE
CMP = CORRUGATED METAL PIPE
RCP = REINFORCED CONCRETE PIPE

⊕ MW-6A LOCATION OF MONITORING WELLS
SCREENED IN FILL MATERIAL

⊕ MW-9 LOCATION OF MONITORING WELLS
SCREENED IN TILL MATERIAL

VALUE IN PARENTHESIS REPRESENTS
THE CONCENTRATION OF DETECTED
ETHYLBENZENE IN ug/L. ALL
SAMPLES WERE COLLECTED ON
NOVEMBER 20, 1991.



FACILITY AT 3200 MAIN STREET
KEOKUK, IOWA

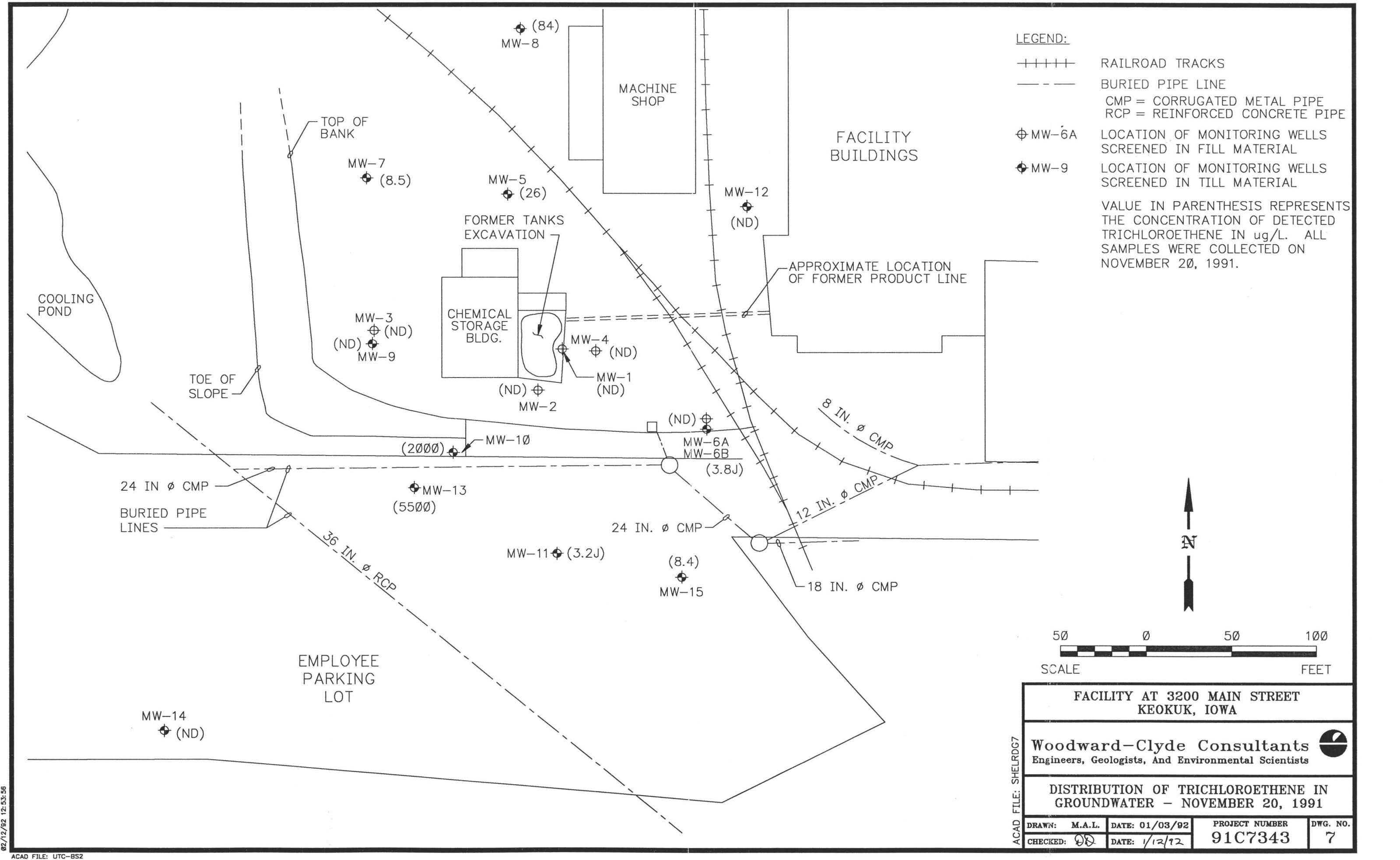
Woodward-Clyde Consultants
Engineers, Geologists, And Environmental Scientists

DISTRIBUTION OF ETHYLBENZENE IN
GROUNDWATER - NOVEMBER 20, 1991

DRAWN: M.A.L.	DATE: 01/03/92	PROJECT NUMBER	DWG. NO.
CHECKED: [Signature]	DATE: 1/12/92	91C7343	6

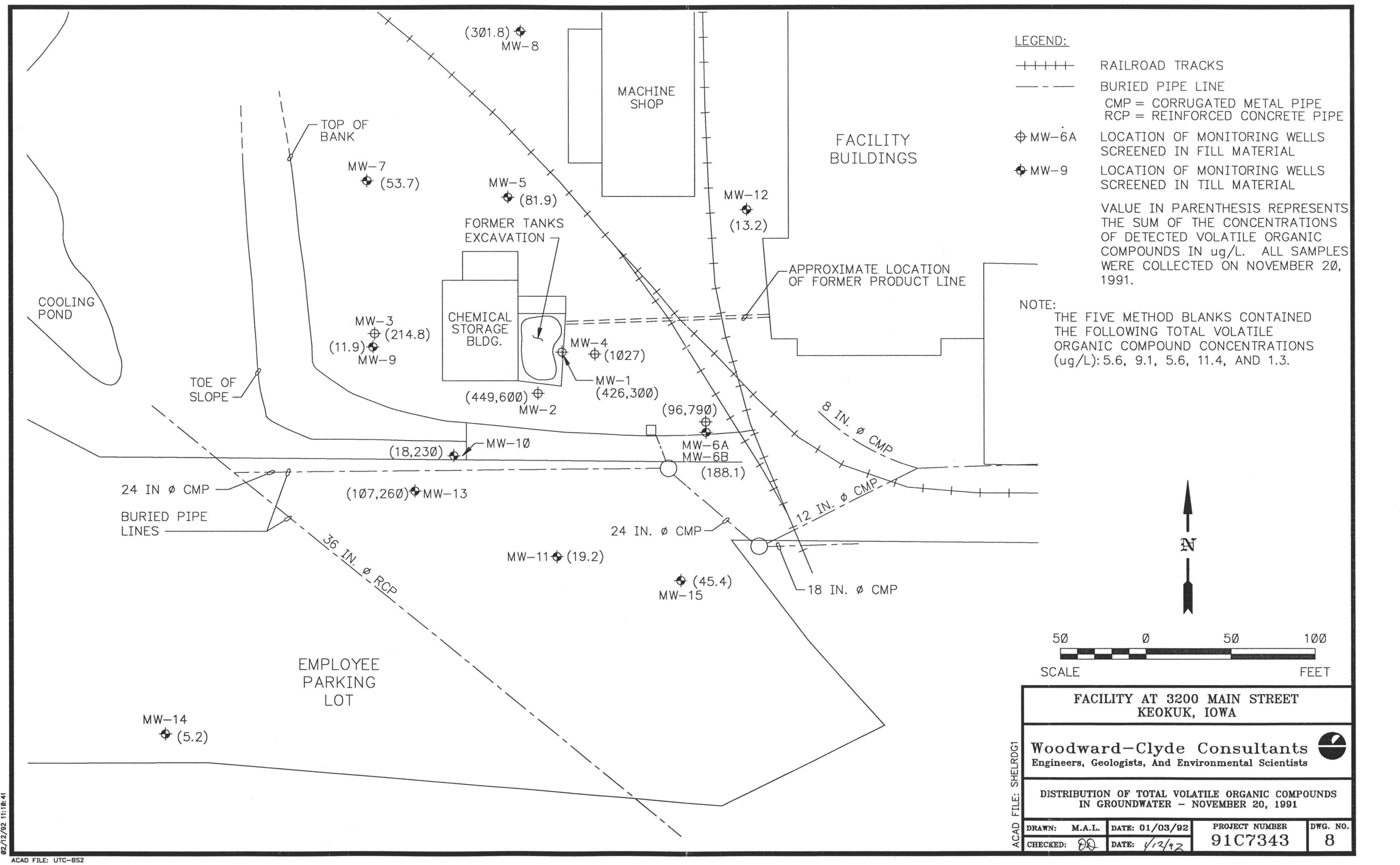
ACAD FILE: SHELDRG6

02/12/92 11:28:49



FACILITY AT 3200 MAIN STREET KEOKUK, IOWA			
Woodward-Clyde Consultants Engineers, Geologists, And Environmental Scientists			
DISTRIBUTION OF TRICHLOROETHENE IN GROUNDWATER - NOVEMBER 20, 1991			
DRAWN: M.A.L.	DATE: 01/03/92	PROJECT NUMBER	DWG. NO.
CHECKED: DD	DATE: 1/12/92	91C7343	7

02/12/92 12:53:56



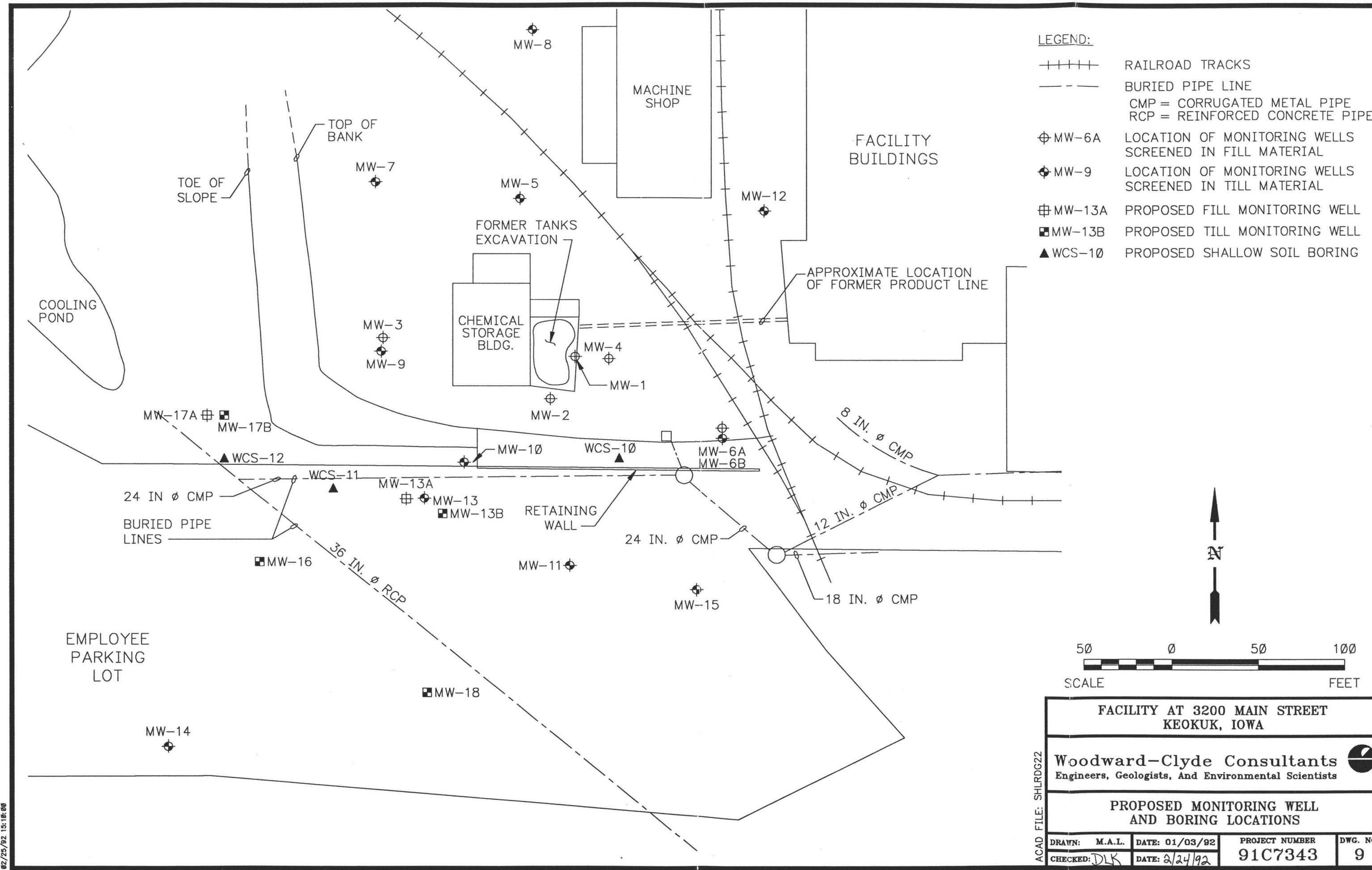
FACILITY AT 3200 MAIN STREET
KEOKUK, IOWA

Woodward-Clyde Consultants
Engineers, Geologists, And Environmental Scientists

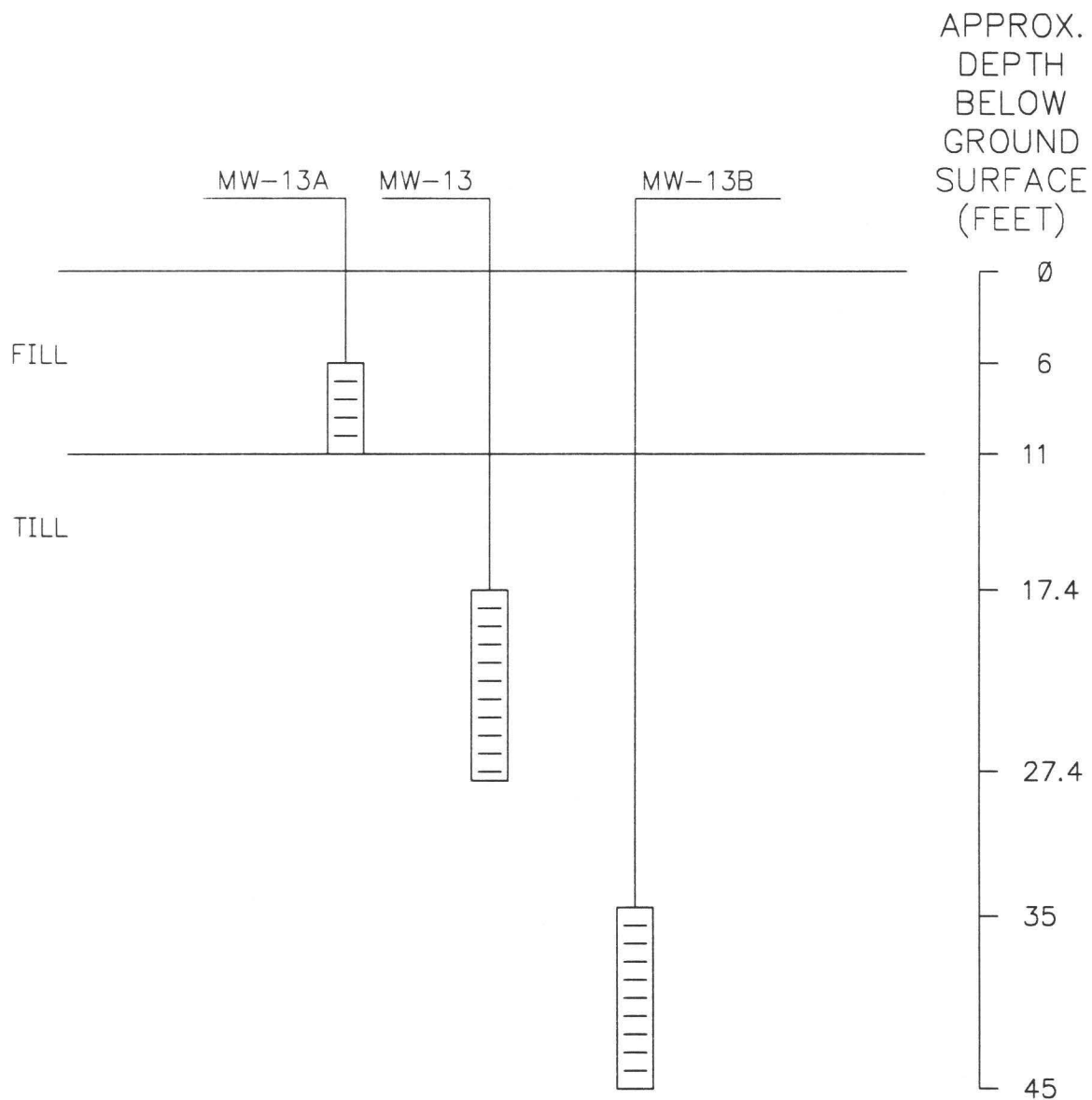
DISTRIBUTION OF TOTAL VOLATILE ORGANIC COMPOUNDS
IN GROUNDWATER - NOVEMBER 20, 1991

DRAWN: M.A.L.	DATE: 01/03/92	PROJECT NUMBER	DWG. NO.
CHECKED: <i>DD</i>	DATE: 1/12/92	91C7343	8

02/25/92 15:10:00



ACAD FILE: SHLRD622



NOT TO SCALE

FACILITY AT 3200 MAIN STREET
KEOKUK, IOWA

Woodward-Clyde Consultants
Engineers, Geologists, And Environmental Scientists



SCREEN INTERVALS OF
PROPOSED MW-13 WELL CLUSTER

DRAWN: D.D.S.	DATE: 02/10/92	PROJECT NUMBER	DWG. NO.
CHECKED: DLK	DATE: 2/24/92	91C7343	10

ACAD FILE: SHLRDG21

APPENDIXES

APPENDIX A
WORK PLAN AMENDMENT LETTER

September 20, 1991

Jim Thayer
Environmental Specialist
Solid Waste Section
Iowa Dept. of Natural Resources
Wallace State Office Building
Des Moines, IA 50319

Re: Additional Work Activities to be conducted at the
Former Sheller-Globe Facility, 3200 Main St., Keokuk, Iowa

Dear Mr. Thayer:

In response to your letter of July 31, 1991, this letter will fulfill the IDNR requirements of Sheller-Globe concerning the submittal of a work plan for the additional work to be conducted at the site this Fall. As you are aware, Sheller-Globe has submitted two previous workplans which included procedures and protocols for well drilling and soil and groundwater sampling activities. The proposed additional site work is very similar to those activities performed earlier. As we discussed by telephone, in an effort not to generate another lengthy work plan document I will reference portions of the Pollution Control Systems (PCS) Phase III Site Assessment Work Plan (dated February 22, 1991) in this letter, when appropriate, since the procedures or protocols for the proposed work will be identical or very similar.

In the Phase III Site Assessment Report, prepared by Woodward-Clyde Consultants (WCC) dated July 1991, two additional monitoring wells were proposed downgradient of monitoring well MW-10. These well locations are situated downgradient of the present chemical storage and mixing building and the former underground storage tank locations. The IDNR letter (7/31/91) requested that a third well be installed downgradient of the approximate location of the former chemical storage and mixing building. As part of the additional investigative activities at the site Sheller-Globe will install these three wells at proposed locations shown in Attachment I. Two of these well locations were previously proposed in the WCC Phase III Site Assessment Report. The proposed well locations are approximate and may need to be moved slightly due to obstacles encountered in the field.

Jim Thayer
Iowa Dept. of Natural Resources
September 20, 1991

The three monitoring wells will be installed in accordance with the procedures described in the PCS Work Plan. The well screen lengths will be ten (10) feet and consist of 0.010-inch machine slotted screen. Soil samples from the soil borings (advanced at the well locations) will also be collected in accordance with the soil sampling procedures (or equivalent protocol) discussed in that work plan. However, the soil sampling interval will be 2.5 feet instead of 5.0 feet. The soil samples will only be collected and used to characterize the stratigraphy at each well location. No soil samples are planned for submittal to a laboratory. The borings and wells will be advanced/installed to a maximum depth of thirty-five (35) feet using hollow-stem augers. Soil boring logs, well installation details and chain of custody records will also be used and generated as part of this phase of work. The forms which will be used will be identical to those included in the WCC Phase III Site Assessment Report.

During the conduct of the field activities the ground and top of well casing for each of the three new wells will be surveyed relative to one of the existing wells. Within approximately seven to fourteen days after the installation of the three proposed wells, groundwater samples will be collected from all the monitoring wells in and around the former underground storage tank locations. This will be a total of sixteen (16) wells. Measurements of pH, temperature, salinity, and conductivity will be recorded in the field during the sampling. Prior to the groundwater sampling, depth to water measurements will be recorded for use in developing an updated groundwater contour map at a later time. The groundwater samples will be collected in accordance with the procedures (or equivalent protocol) described in the PCS Work Plan. The samples will be submitted to a certified laboratory for analysis of the EPA Method 8240 volatile organic compounds, along with methyl isobutyl ketone, n-hexane, and butanol. For quality control purposes, two groundwater samples will be submitted to the laboratory in duplicate along with one trip blank sample.

At the conclusion of the field work and data evaluation, a report will be prepared describing the field and analytical methods, field and laboratory data, findings, and conclusions. The report will contain tables of the contaminant concentrations in the groundwater, an updated groundwater contour map, a contaminant distribution map for the three or four primary contaminants in the groundwater, boring logs, well installation details, sampling data sheets, and chain of custody records. This report will also include recommendations for further work if warranted.

Jim Thayer
Iowa Dept. of Natural Resources
September 20, 1991

The scheduling for this additional work will depend on obtaining IDNR approval for the proposed work and on work scheduled for the Grimes/Sheller-Globe Superfund site. The field activities to be conducted for the Superfund project are scheduled to begin October 1, 1991. The work activities for both projects are being performed by WCC. At this time we are planning to use the same drilling company to perform the drilling services required for both sites. Therefore, Sheller-Globe proposes that the drilling for the former Sheller-Globe plant site be scheduled to begin at the end of the drilling program for the superfund project.

At this time we anticipate the drilling activities for the superfund project to take approximately four to six weeks. Therefore, drilling at the plant site would occur sometime during mid to late November, 1991. The drilling activities would take approximately three to five days to complete, followed by a seven to fourteen day period (allowing the new wells to settle) after which all wells would be sampled. The final report would then be submitted to the IDNR approximately sixty (60) days after the groundwater sampling was completed. This allows three to four weeks for turn around of the sample results at the laboratory. Under this proposed schedule the final report would be available to the IDNR in early to mid February, 1992.

The WCC Phase III Site Assessment Report also recommended the evaluation of a soil vapor extraction system for remediating the soils and perched groundwater in the former underground storage tank area. Sheller-Globe has received several proposals for conducting a pilot test of such a system (various alternative systems). Sheller-Globe is planning on conducting the pilot test at the site during the Fall of 1991. I will be sending you the details for this pilot test prior to the work being conducted.

Sheller-Globe is seeking to enter into a formal consent agreement with the IDNR for the conduct of this remedial project. I will be contacting you in the near future to discuss this matter.

Jim Thayer
Iowa Dept. of Natural Resources
September 20, 1991

If you have any questions concerning the proposed activities discussed herein, please feel free to call me at (203) 728-7622.

Very Truly Yours;

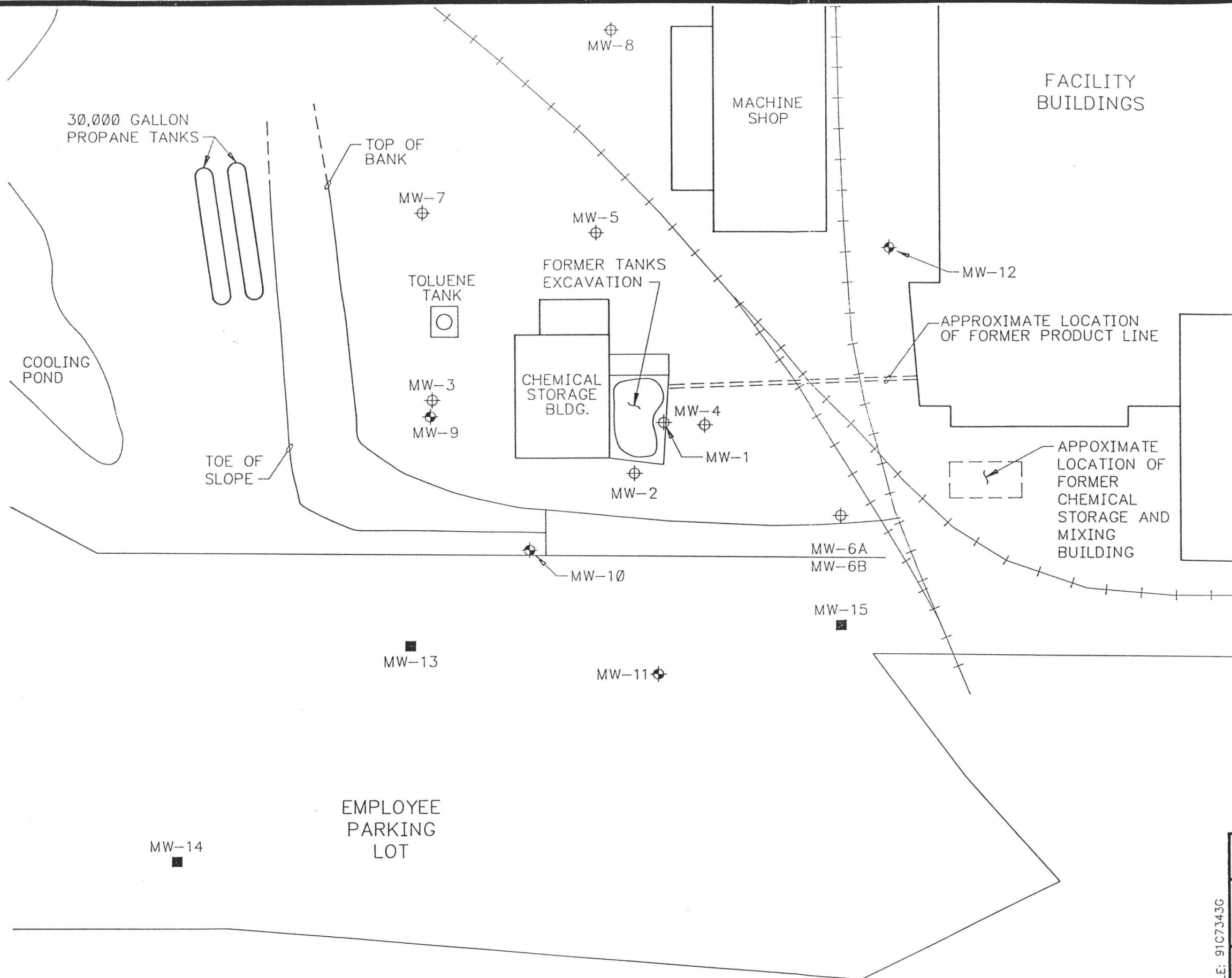


Brian J. Yeich
Corporate Environmental Project Scientist

cc: Joe Gregg, Esq.
David A. Dods
Frederick W. Johnson
Harold R. Gibson

APPENDIX B

IOWA DEPARTMENT OF NATURAL RESOURCES COMMENT LETTER



LEGEND:

- +++++ RAILROAD TRACK
- ⊕ MW-6A LOCATION OF EXISTING MONITORING WELLS
- ⊙ MW-9 LOCATION OF MONITORING WELLS INSTALLED IN MAY, 1991.
- MW-13 LOCATION OF PROPOSED MONITORING WELLS



FORMER SELLER - GLOBE FACILITY
KEOKUK, IOWA

Woodward-Clyde Consultants
Engineers, Geologists, And Environmental Scientists



EXISTING AND PROPOSED
MONITORING WELL LOCATIONS

DRAWN: M.A.L.	DATE: 07/01/91	PROJECT NUMBER	FIG. NO.
CHECKED: C.J.F.	DATE: 9/9/91	91P7343-4	1

ACAD FILE: 91C7343G



TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

July 31, 1991

Brian J. Yeich
Corporate Environmental Scientist
United Technologies
Hartford, Connecticut 06101

RECEIVED

AUG 23 1991

REMEDIATION GROUP

RE: Sheller-Globe, 3200 Main St., Keokuk, Iowa

Dear Mr. Yeich:

We have had an opportunity to review the July 17, 1991 Phase III Site Assessment Report for the above referenced site. The following comments relate to our concern about future activities at the site and some perceived needs with regard to Chapter 133. We would like to see the following activities performed in addition to the installation of two monitoring wells listed under recommendations on page 6-2 of the report.

(1) An additional monitoring well located in the area downgradient of the approximate location of the former chemical storage and mixing building. This well should help determine the horizontal extent of the main contaminant area in a southeasterly direction, in addition to revealing possible contamination from the former building area.

(2) After installation of the three new monitoring wells, as referenced above, sampling of ALL existing wells for volatile organics. Sampling of ALL existing wells will help to determine the true level of contaminants in MW-12. If a consistent excessive level of vinyl chloride persists in MW-12, a new background well may have to be installed. Sampling of ALL wells will also provide more information on which to base future investigative activities in the area of MW-5, MW-7, and MW-8.

The depth of MW-4 (11.92 ft.) listed on TABLE 1 of the report differs from that of previous reports (15 ft.) and an error exists in the depth to groundwater for MW-4 in TABLE 1. We have noted the differences on our copy.

We will look forward to reviewing a detailed corrective action plan for remediation of groundwater near MW-1, MW-2, MW-3, and MW-4 using a vapor extraction system. Please realize that subsequent investigative results may necessitate the alteration or enhancement of the proposed system.

Brian J. Yeich

Page 2

We will look for a workplan addressing items (1) and (2) as referenced above by September 9, 1991. Thank you for your cooperation in this matter.

Sincerely,



Jim Thayer
Environmental Specialist
Solid Waste Section

cc: Field Office 6
Harold Gibson, Schlegal Corp.

APPENDIX C
BORING LOGS

BORING LOG

MW-13

PROJECT NAME Sheller-Globe Facility
 PROJECT LOCATION Keokuk, Iowa
 LOGGED BY C. Fitzgerald DRILLED BY Matt Ledford
 SURFACE ELEVATION 623.5 ELEVATION DATUM MSL
 GROUND WATER Water enters at 17.5' ATD
 OBSERVATIONS _____

SHEET 1 of 2
 PROJECT NO. 91C7343
 TASK NO. 0031
 DATE 11/6/91
 RIG Mobile B-61


DEPTH, ft.	SAMPLE			DESCRIPTION	SYMBOL	ELEVATION	FIELD NOTES
	TYPE	RECOVERY	RESISTANCE				
0				Concrete			Boring advanced with 4 1/4" I.D. HSA
	CS			Stiff, olive-brown to dark olive-brown, low to medium plastic silty clay FILL with rock fragments and organics		620	WC > PL HNu = Back Ground (BG) inside sample
5	CS			Becoming soft, black with chemical odor			WC > PL
				Becoming olive-brown with some iron staining		615	HNu = 3 ppm inside sample
10	CS			Firm to stiff, olive-brown to dark olive-brown, low plastic silty CLAY with some iron staining (CL)			HNu = 10 ppm inside augers. Breathing Zone = Back Ground (BZ = BG)
						610	Hnu = 2 ppm inside sample
15	CS						
				Very dense, dark yellowish-brown to reddish-brown, poorly-graded fine-grained SAND with silt and clay (SP-SC)		605	HNu = BG inside sample
20	CS			Very stiff, dark yellowish-brown to reddish-brown with some gray mottling, highly plastic CLAY with fine to coarse sand and trace fine gravel (CH)			Sand is saturated
				With a vertical fracture (fracture surface is gray)		600	Cuttings are wet (Olive)
25				With thin (2") fine-grained sand seam			

BORING LOG

MW-13

PROJECT NAME Sheller-Globe Facility
 PROJECT LOCATION Keokuk, Iowa
 LOGGED BY C. Fitzgerald DRILLED BY Matt Ledford
 SURFACE ELEVATION 623.5 ELEVATION DATUM MSL
 GROUND WATER Water enters at 17.5' ATD
 OBSERVATIONS _____

SHEET 2 of 2
 PROJECT NO. 91C7343
 TASK NO. 0031
 DATE 11/6/91
 RIG Mobile B-61

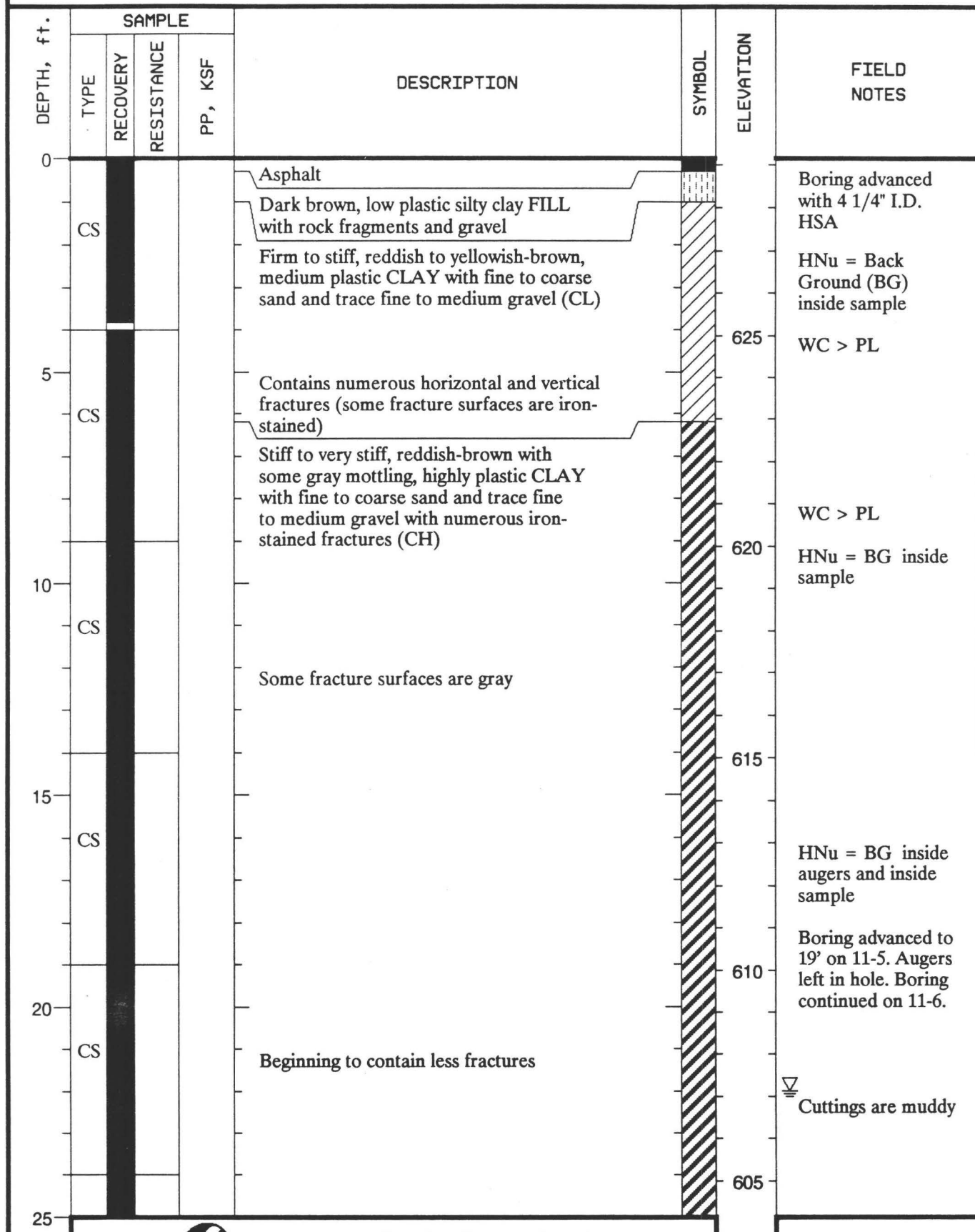
DEPTH, ft.	SAMPLE			DESCRIPTION	SYMBOL	ELEVATION	FIELD NOTES
	TYPE	RECOVERY	RESISTANCE				
25	CS			SAME: Very stiff, dark yellowish-brown to reddish-brown with some gray mottling, highly plastic CLAY with fine to coarse sand and trace fine gravel (CH) with thin (2") fine sand seam Becoming more gravelly		595	WC = PL HNu = BG inside sample
30							
35							Bottom of boring 29' 2" PVC Monitoring Well installed upon completion of boring
40						590	
						585	
45						580	
						575	
50							

BORING LOG

MW-14

PROJECT NAME Sheller-Globe Facility
 PROJECT LOCATION Keokuk, Iowa
 LOGGED BY C. Fitzgerald DRILLED BY Matt Ledford
 SURFACE ELEVATION 629.1 ELEVATION DATUM MSL
 GROUND WATER Water enters at 22' ATD
 OBSERVATIONS _____

SHEET 1 of 2
 PROJECT NO. 91C7343
 TASK NO. 0031
 DATE 11/6/91
 RIG Mobile B-61



BORING LOG

MW-14

PROJECT NAME Sheller-Globe Facility
 PROJECT LOCATION Keokuk, Iowa
 LOGGED BY C. Fitzgerald DRILLED BY Matt Ledford
 SURFACE ELEVATION 629.1 ELEVATION DATUM MSL
 GROUND WATER Water enters at 22' ATD
 OBSERVATIONS _____

SHEET 2 of 2
 PROJECT NO. 91C7343
 TASK NO. 0031
 DATE 11/6/91
 RIG Mobile B-61

DEPTH, ft.	SAMPLE				DESCRIPTION	SYMBOL	ELEVATION	FIELD NOTES
	TYPE	RECOVERY	RESISTANCE	PP, KSF				
25	CS				SAME: Stiff to very stiff, reddish-brown with some gray mottling, highly plastic CLAY with fine to coarse sand and trace fine to medium gravel with numerous iron stained fractures (CH)		600	WC > PL HNu = BG inside sample
					With a rounded cobble (2")			
30	CS				Becoming more sandy		595	Bottom of boring 34' 2" PVC Monitoring Well installed upon completion of boring
					Very dense, reddish-brown, poorly-graded fine SAND with silt and clay (SP-SC)			
35					Very stiff, reddish-brown, highly plastic CLAY with fine to coarse sand and trace fine to coarse gravel (CH)			
40								
45								
50								



BORING LOG

MW-15

PROJECT NAME Sheller-Globe Facility
 PROJECT LOCATION Keokuk, Iowa
 LOGGED BY C. Fitzgerald DRILLED BY Matt Ledford
 SURFACE ELEVATION 629.8 ELEVATION DATUM MSL
 GROUND WATER Water level at 31' 1 hour AD
 OBSERVATIONS _____

SHEET 1 of 2
 PROJECT NO. 91C7343
 TASK NO. 0031
 DATE 11/5/91
 RIG Mobile B-61

DEPTH, ft.	SAMPLE			DESCRIPTION	SYMBOL	ELEVATION	FIELD NOTES
	TYPE	RECOVERY	RESISTANCE				
0				Asphalt			Boring advanced with 4 1/4" I.D. HSA
	CS			Firm, yellowish-brown with some gray mottling, medium plastic silty CLAY with fine to coarse sand and trace fine to medium gravel (CL)			HNu = Back Ground (BG) inside sample WC > PL
5						625	
	CS			Stiff to very stiff, yellowish-brown, highly plastic CLAY with fine to coarse sand and trace fine to medium gravel (CH)			HNu = BG inside sample WC > PL
				With a vertical fracture (fracture surface is gray)			
10						620	
	CS			With a verticle and horizontal fracture (fracture surfaces are gray)			
				Becoming very stiff			WC > PL
15						615	
	CS						HNu = BG inside augers
				With vertical fracture (fracture surface is gray, silty)			
20						610	
	CS						HNu = BG inside sample
25						605	Cuttings are moist

BORING LOG

MW-15

PROJECT NAME Sheller-Globe Facility
 PROJECT LOCATION Keokuk, Iowa
 LOGGED BY C. Fitzgerald DRILLED BY Matt Ledford
 SURFACE ELEVATION 629.8 ELEVATION DATUM MSL
 GROUND WATER Water level at 31' 1 hour AD
 OBSERVATIONS _____

SHEET 2 of 2
 PROJECT NO. 91C7343
 TASK NO. 0031
 DATE 11/5/91
 RIG Mobile B-61

DEPTH, ft.	SAMPLE				DESCRIPTION	SYMBOL	ELEVATION	FIELD NOTES
	TYPE	RECOVERY	RESISTANCE	PP, KSF				
25	CS				SAME: Very stiff, yellowish-brown, highly plastic CLAY with fine to coarse sand and trace fine to medium gravel (CH) Contains a few fractures (fracture surfaces contain fine sand and silt)		600	Sampler is wet Water level 1 hour after drilling Cuttings are wet Sampler is wet
30								
	CS				Contains sand and silt- filled horizontal and vertical fractures. Sand is wet With iron staining Contains vertical fracture (fracture surface is gray)		595	Bottom of boring 34' 2" PVC Monitoring Well installed upon completion of boring
35								
40							590	
45							585	
50							580	



Woodward-Clyde Consultants

Figure No. A-6
 /OPPL/1-17-92

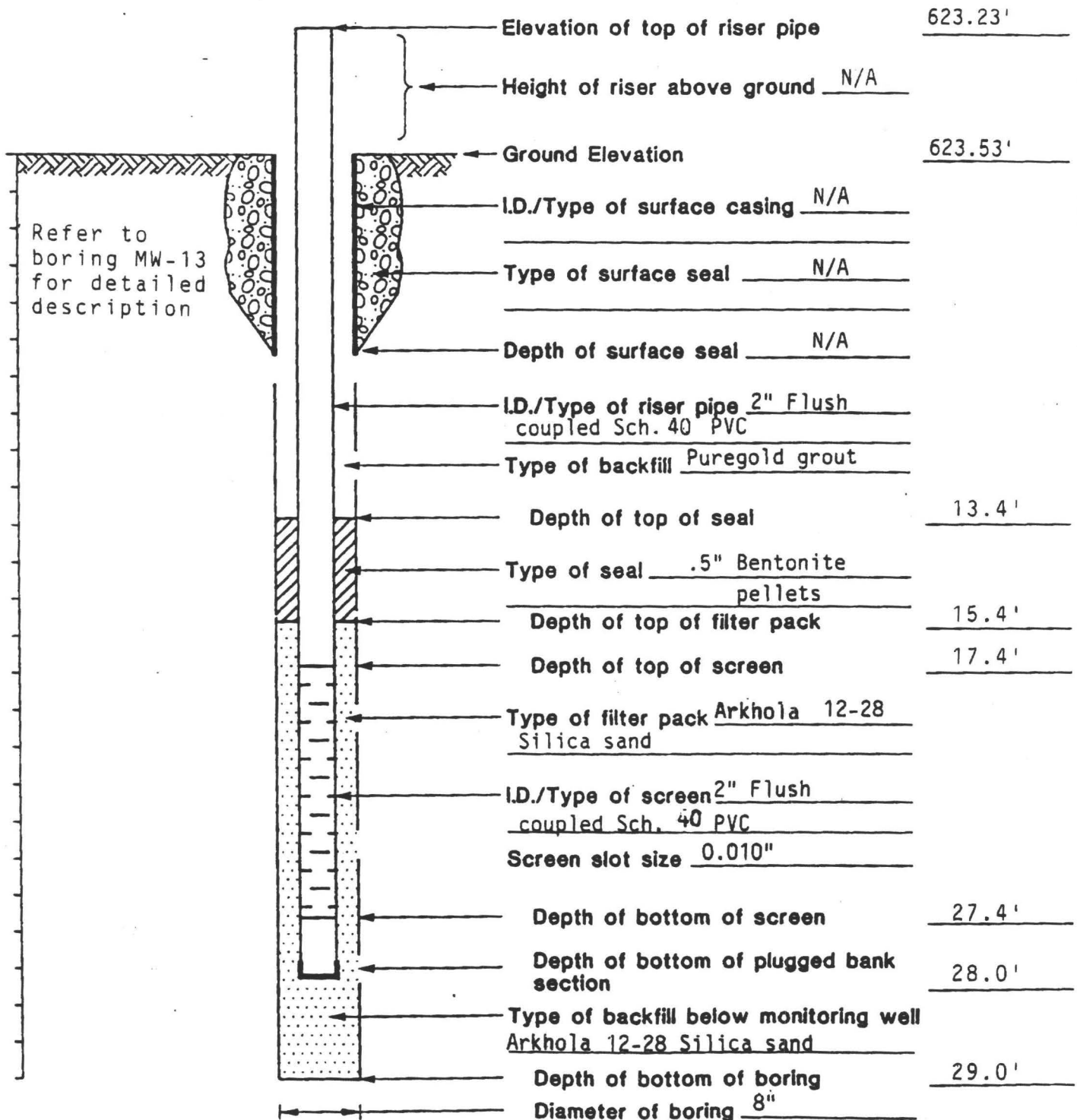
APPENDIX D
MONITORING WELL INSTALLATION REPORTS

GROUND WATER MONITORING WELL REPORT

Project Name Sheller-Globe Facility
 Location Keokuk, Iowa
 Installed by Winnek, Inc. (Matt Ledford)
 Inspected by Cris Fitzgerald
 Method of Installation 4 1/4" I.D. HSA
 Remarks _____

Monitor Well No. MW-13
 Project No. 91C7343
 Date 11/6/91
 Time 15:30

Monitoring well is flush mounted.

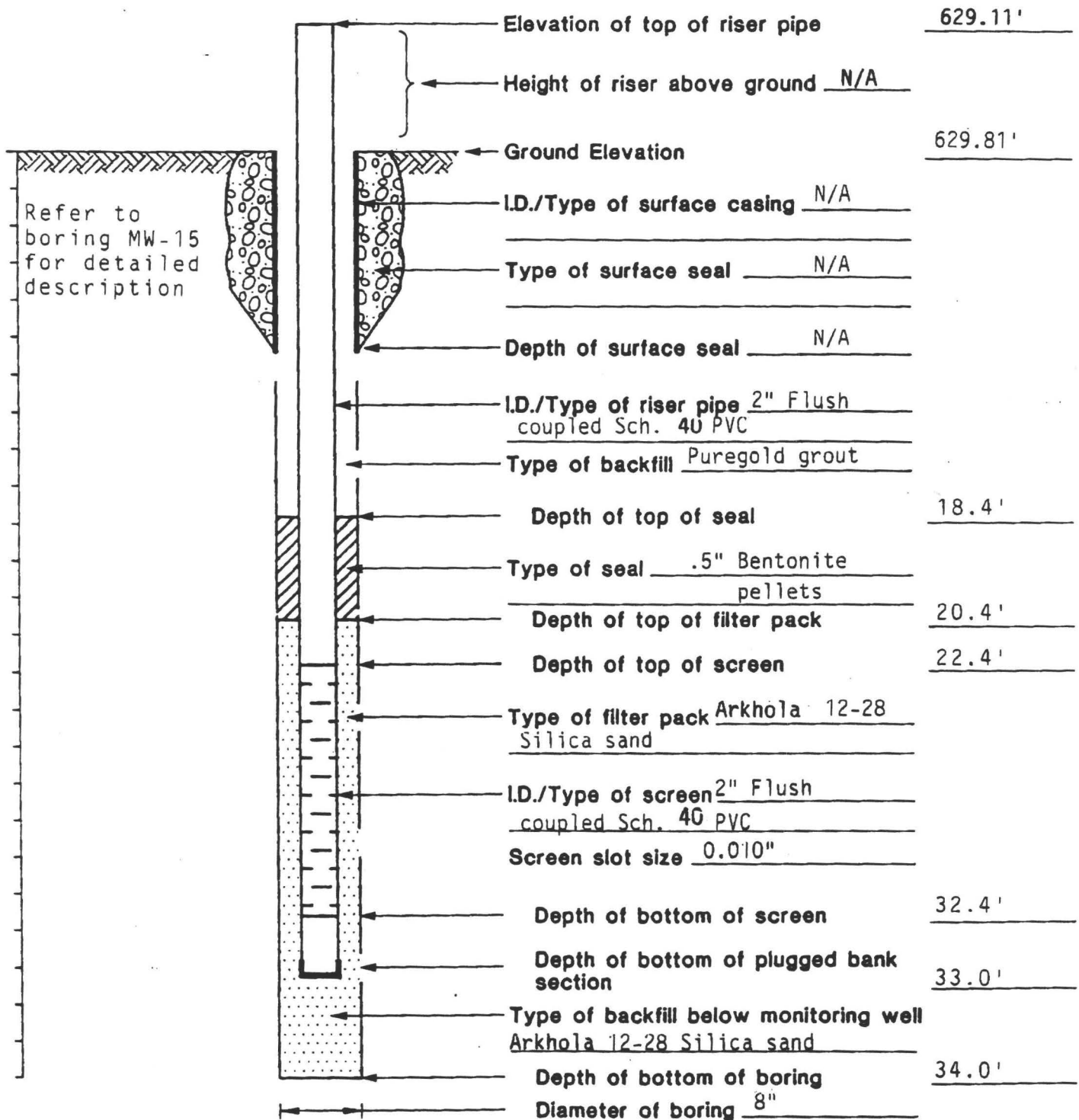


GROUND WATER MONITORING WELL REPORT

Project Name Sheller-Globe Facility
 Location Keokuk, Iowa
 Installed by Winnek, Inc. (Matt Ledford)
 Inspected by Chris Fitzgerald
 Method of Installation 4 1/4" I.D. HSA
 Remarks _____

Monitor Well No. MW- 15
 Project No. 91C7343
 Date 11/5/91
 Time 13:15

Monitoring well is flush mounted

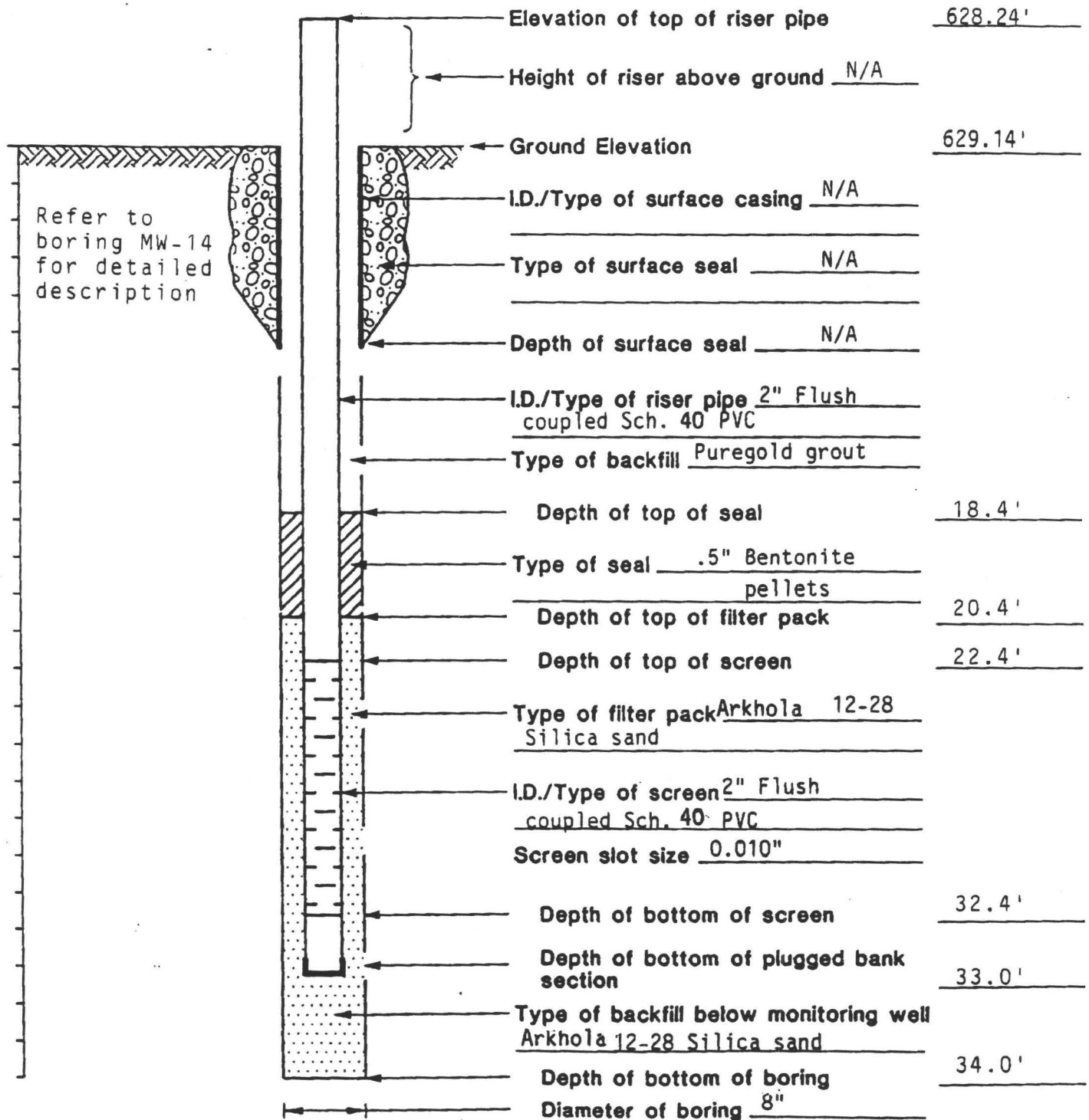


GROUND WATER MONITORING WELL REPORT

Project Name Sheller-Globe Facility
 Location Keokuk, Iowa
 Installed by Winnek, Inc. (Matt Ledford)
 Inspected by Chris Fitzgerald
 Method of Installation 4 1/4" I.D. HSA
 Remarks _____

Monitor Well No. MW-14
 Project No. 91C7343
 Date 11/6/91
 Time 09:15

Monitoring well is flush mounted



APPENDIX E
SAMPLE COLLECTION FIELD SHEETS

**WOODWARD-CLYDE CONSULTANTS**

P.O. BOX 3777
5055 Antioch Road
Overland Park, Kansas 66203
(913) 432-4242

WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SC- Keokuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-1 PERSONNEL: D. Dees, D. Keokuk
LOCATION DESCRIPTION MW-1, directly east of tanks
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: _____
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 4.53
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1630 METHOD: bailler

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3 - 40 mL VOA</u>	<u>4°C</u>	<u>8240 volatiles</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FIELD ANALYSIS

TEMPERATURE, °C _____	DATE <u>Purged 11/19/91</u>
SAMPLE pH _____	TIME <u>Sampled 11/20/91</u>
SALINITY, PARTS PER THOU _____	APPEARANCE _____
CONDUCTIVITY, umhos/cm _____	ODOR _____
pH BUFFER BEFORE _____	pH BUFFER AFTER _____
COMMENTS <u>vol. purged</u>	<u>8</u>
<u>cond</u>	<u>1480</u>
<u>temp</u>	<u>16.5</u>

DEVELOPMENT/PURGING

DATE _____	CASING DIAMETER <u>4"</u>
WATER LEVEL BEFORE <u>4.44' / 6.4 gal</u>	WELL DEPTH (SOUNDED) <u>14.21</u>
WATER LEVEL AFTER <u>dry</u>	TIME STARTED _____
EST. VOLUME REMOVED <u>8 gal.</u>	TIME COMPLETED _____
HNu/OVA, BACKGROUND <u>0.2</u>	METHOD <u>bailler</u>
HNu/OVA, WELL HEAD <u>100-250</u>	HNu/OVA, BREATHING ZONE <u>BG</u>
COMMENTS _____	_____



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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Keokuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-2 PERSONNEL: D. Doss, D. Kocour
LOCATION DESCRIPTION MW-2
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: split w/ IDNR
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 7.60'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1200 METHOD: bauler

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40ml VOA</u>	<u>4°C</u>	<u>8240 vds.</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FIELD ANALYSIS

TEMPERATURE, °C _____	DATE <u>pured 11/19/91</u>
SAMPLE pH _____	TIME <u>sampled 11/20/91</u>
SALINITY, PARTS PER THOU _____	APPEARANCE _____
CONDUCTIVITY, umhos/cm _____	ODOR _____
pH BUFFER BEFORE _____	pH BUFFER AFTER _____
COMMENTS <u>vd. pured</u>	<u>0</u>
<u>cont</u>	<u>1325</u>
<u>temp</u>	<u>15</u>

DEVELOPMENT/PURGING

DATE _____	CASING DIAMETER <u>4"</u>
WATER LEVEL BEFORE <u>6.66 / 4 gal = 1 vol</u>	WELL DEPTH (SOUNDED) <u>12-8'</u>
WATER LEVEL AFTER <u>dry</u>	TIME STARTED _____
EST. VOLUME REMOVED <u>6 gal.</u>	TIME COMPLETED _____
HNU/OVA, BACKGROUND <u>0.2</u>	METHOD <u>bailing</u>
HNU/OVA, WELL HEAD <u>100-160</u>	HNU/OVA, BREATHING ZONE <u>BG</u>
COMMENTS _____	_____



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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Kookuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: mw-3 PERSONNEL: D. Dicks, D. Kocour
LOCATION DESCRIPTION: mw-3 west of Haz. waste storage shed
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO: SPLIT SAMPLE NUMBER: _____
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 13.05'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1520 METHOD: bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3 40ml VOA</u>	<u>4°C</u>	<u>8240 vols.</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE 11/19/91 - purged
SAMPLE pH _____ TIME 11/20/91 - sampled
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

<u>vol. purged</u>	<u>0</u>	<u>4 gal</u>		
<u>cond.</u>	<u>1200</u>	<u>1125</u>		
<u>temp</u>	<u>16</u>	<u>16.25</u>		

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 4"
WATER LEVEL BEFORE 11.89' = 3.2 gal WELL DEPTH (SOUNDED) 16.8'
WATER LEVEL AFTER dry TIME STARTED _____
EST. VOLUME REMOVED 4 gal TIME COMPLETED _____
HNU/OVA, BACKGROUND 0.2 METHOD _____
HNU/OVA, WELL HEAD 0.2 HNU/OVA, BREATHING ZONE _____
COMMENTS _____

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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Keokuk PROJECT NUMBER: 91CT343
SAMPLE NUMBER: MW-4 PERSONNEL: D. Dede, D. Kocou
LOCATION DESCRIPTION MW-4 next to former excavation (E. side)
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: _____
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 4.48'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1620 METHOD: Bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40ml VOA</u>	<u>4°C</u>	<u>2240 vols.</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE Purged 11/19/91
SAMPLE pH _____ TIME sampled 11/20/91
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

<u>vol. purged</u>	<u>0</u>	<u>7 gal</u>		
<u>cond.</u>	<u>1300</u>	<u>1250</u>		
<u>Temp</u>	<u>14.5°C</u>	<u>16°C</u>		

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 4"
WATER LEVEL BEFORE 4.30 / 5 gal WELL DEPTH (SOUNDED) 11.9'
WATER LEVEL AFTER dry TIME STARTED _____
EST. VOLUME REMOVED 7 gal TIME COMPLETED _____
HNU/OVA, BACKGROUND 0.2 METHOD bailing
HNU/OVA, WELL HEAD 1.0 HNU/OVA, BREATHING ZONE BG
COMMENTS _____



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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: S-G Keokuk PROJECT NUMBER: 91C7343

SAMPLE NUMBER: MW-5 PERSONNEL: D. Dods, D. Keokuk

LOCATION DESCRIPTION

SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____

SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: split w/ IDNR

WATER LEVEL: _____ VOA's & samplers

WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 18.81

COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1115 METHOD: bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3.40ml VOA</u>	<u>4°C</u>	<u>8240 VOA's</u>

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE purged 11/19/91

SAMPLE pH _____ TIME sampled 11/20/91

SALINITY, PARTS PER THOU _____ APPEARANCE _____

CONDUCTIVITY, umhos/cm _____ ODOR _____

pH BUFFER BEFORE _____ pH BUFFER AFTER _____

COMMENTS vol. purged 0 15 23

cond 1600 1625 16725

temp 17 16.5 16

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER _____

WATER LEVEL BEFORE 2.77' / = 14.4 gal WELL DEPTH (SOUNDED) _____

WATER LEVEL AFTER dry TIME STARTED _____

EST. VOLUME REMOVED 23 gal TIME COMPLETED _____

H₂O/OVA, BACKGROUND 0.3 METHOD _____

H₂O/OVA, WELL HEAD 0.8 H₂O/OVA, BREATHING ZONE 0.2

COMMENTS _____

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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: S-G Keckuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-6A PERSONNEL: DDs, D. Kocour
LOCATION DESCRIPTION MW-6 cluster, east well (nearest RR track)
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: split w/ IDNR
WATER LEVEL: VOA & semis
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 11.39'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1140 METHOD: bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40ml VOA</u>	<u>4°C</u>	<u>8240 vols.</u>

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE well purged 11/19/91
SAMPLE pH meter out of order TIME sampled 11/20/91
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

<u>purge vol.</u>	<u>0</u>	<u>2 gal</u>	<u>3 gal</u>
<u>cond</u>	<u>2600</u>	<u>2650</u>	<u>2680</u>
<u>temp.</u>	<u>16.5°C</u>	<u>17.5°C</u>	<u>17.0°C</u>

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 2"
WATER LEVEL BEFORE 7.11 / = 1' gal WELL DEPTH (SOUNDED) 13.94'
WATER LEVEL AFTER dry TIME STARTED _____
EST. VOLUME REMOVED 3 gal TIME COMPLETED _____
HNU/OVA, BACKGROUND 0.2 METHOD bailer
HNU/OVA, WELL HEAD 3-5 HNU/OVA, BREATHING ZONE _____
COMMENTS _____



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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Keokuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-6B PERSONNEL: D. Dods, D. Kocour
LOCATION DESCRIPTION: MW-6 cluster, west well (nearest chem. mix bldg.)
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES (NO): SPLIT SAMPLE NUMBER: _____
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 7.64'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1605 METHOD: bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40 ml VOA</u>	<u>4°C</u>	<u>8240 vds.</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE _____
SAMPLE pH _____ TIME _____
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

<u>purge vol</u>	<u>0</u>	<u>4 gal</u>	<u>9 gal</u>	<u>12 gal</u>
<u>cond</u>	<u>3950</u>	<u>3950</u>	<u>3900</u>	<u>3900</u>
<u>temp</u>	<u>17.0°C</u>	<u>16.5°C</u>	<u>15.5°C</u>	<u>15.5°C</u>

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 2"
WATER LEVEL BEFORE 7.46' = 4 gal WELL DEPTH (SOUNDED) 31.8'
WATER LEVEL AFTER dry TIME STARTED _____
EST. VOLUME REMOVED 12 gal TIME COMPLETED _____
HNU/OVA, BACKGROUND 0.2 METHOD bailing
HNU/OVA, WELL HEAD 3 HNU/OVA, BREATHING ZONE _____
COMMENTS _____

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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Keokuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: mw-7 PERSONNEL: D. Dees, D. Kour
LOCATION DESCRIPTION well NW of toluene tank
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO SPLIT SAMPLE NUMBER: _____
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 11.16'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1540 METHOD: bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3 VOA vials</u> <u>(40ml)</u>	<u>4°C</u>	<u>8240 vds</u>

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE purged + sampled 11/20/91
SAMPLE pH _____ TIME _____
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

<u>vol purged</u>	<u>0</u>	<u>5 gal</u>	<u>10</u>	<u>15 gal</u>	
<u>cond</u>	<u>160</u>	<u>1050</u>	<u>925</u>	<u>1100</u>	
<u>temp</u>	<u>17.5°C</u>	<u>16.0°C</u>	<u>15</u>	<u>15°C</u>	

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 2"
WATER LEVEL BEFORE 11.00' / = 4.6 gal WELL DEPTH (SOUNDED) 28.1'
WATER LEVEL AFTER _____ TIME STARTED _____
EST. VOLUME REMOVED _____ TIME COMPLETED _____
HNU/OVA, BACKGROUND 0.2 METHOD _____
HNU/OVA, WELL HEAD 0.2 HNU/OVA, BREATHING ZONE _____
COMMENTS _____



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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Kookak PROJECT NUMBER: 91C7343
SAMPLE NUMBER: mw-8 PERSONNEL: D. Dicks, D. Kocour
LOCATION DESCRIPTION: well farthest W of new mix bldg
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: _____
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 7.84'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1550 METHOD: bauler

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3 40ml VOA</u>	<u>4°C</u>	<u>2240 volatiles</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE _____
SAMPLE pH _____ TIME _____
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

vol. purged	0	4 gal	8	12
cond	380	1050	1050	1050
temp.	16.5°C	17.0°C	16.5°C	16°C

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 2"
WATER LEVEL BEFORE 6.75' / 3.7 gal WELL DEPTH (SOUNDED) 29.9'
WATER LEVEL AFTER almost dry TIME STARTED _____
EST. VOLUME REMOVED 12 gal TIME COMPLETED _____
HNU/OVA, BACKGROUND 0.2 METHOD _____
HNU/OVA, WELL HEAD 0.2 HNU/OVA, BREATHING ZONE _____
COMMENTS _____

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WATER SAMPLE COLLECTION FIELD SHEETPROJECT NAME: SG Kechuk PROJECT NUMBER: 91C7343SAMPLE NUMBER: mw-9 PERSONNEL: D. Dicks, D. KocurLOCATION DESCRIPTION Deep well next to mw-3SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____SAMPLE SPLIT (circle one): YES NO SPLIT SAMPLE NUMBER: _____

WATER LEVEL: _____

WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 15.00'COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1510 METHOD: bauler

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-4cm³ VOA</u>	<u>4°C</u>	<u>8240 vols.</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FIELD ANALYSISTEMPERATURE, °C _____ DATE purged & sampled 11/20/91

SAMPLE pH _____ TIME _____

SALINITY, PARTS PER THOU _____ APPEARANCE _____

CONDUCTIVITY, umhos/cm _____ ODOR _____

pH BUFFER BEFORE _____ pH BUFFER AFTER _____

COMMENTS	<u>Vol. Removed</u>	<u>0</u>	<u>5</u>	<u>9.5</u>	
	<u>Cond.</u>	<u>1600</u>	<u>1500</u>	<u>1450</u>	
	<u>Temp.</u>	<u>17.0°C</u>	<u>16.0</u>	<u>15.0</u>	

DEVELOPMENT/PURGINGDATE _____ CASING DIAMETER 2"WATER LEVEL BEFORE 15.11' / - 3.0 gal / 1 vol WELL DEPTH (SOUNDED) 33.6'

WATER LEVEL AFTER _____ TIME STARTED _____

EST. VOLUME REMOVED _____ TIME COMPLETED _____

HNu/OVA, BACKGROUND 0.2 METHOD baulingHNu/OVA, WELL HEAD 0.2 HNu/OVA, BREATHING ZONE _____

COMMENTS _____

**WOODWARD-CLYDE CONSULTANTS**

P.O. BOX 3777
5055 Antioch Road
Overland Park, Kansas 66203
(913) 432-4242

WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Keckuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-10, 10D PERSONNEL: D. Deds, D. Kocour
LOCATION DESCRIPTION: MW-10, down gradient in sidewalk
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: MW-10D
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 1.39'
COLLECTION: YR: 91 MO: 01 DAY: 20 TIME: 1430 METHOD: bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40ml VOA</u>	<u>40C</u>	<u>8240 VOA²</u>
<u>3-40ml VOA</u>	<u>40C</u>	<u>8240 VOAS</u>

FIELD ANALYSIS

TEMPERATURE, °C	DATE	<u>11/19/91 - purged</u>
SAMPLE pH	TIME	<u>11/20/91 - sampled</u>
SALINITY, PARTS PER THOU	APPEARANCE	
CONDUCTIVITY, umhos/cm	ODOR	
pH BUFFER BEFORE	pH BUFFER AFTER	
COMMENTS	<u>vd. purged</u>	<u>0</u>
	<u>cond.</u>	<u>1050</u>
	<u>temp</u>	<u>15</u>

DEVELOPMENT/PURGING

DATE	CASING DIAMETER	<u>4"</u>
WATER LEVEL BEFORE <u>2.14</u> / <u>= 17.9 gal</u>	WELL DEPTH (SOUNDED)	<u>29.7'</u>
WATER LEVEL AFTER <u>~ dry</u>	TIME STARTED	
EST. VOLUME REMOVED <u>28 gal</u>	TIME COMPLETED	
HNu/OVA, BACKGROUND <u>0.2</u>	METHOD	<u>bailing</u>
HNu/OVA, WELL HEAD <u>~5</u>	HNu/OVA, BREATHING ZONE	
COMMENTS		



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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: S-G Keokuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-11 PERSONNEL: D. Dees, D. Kocour
LOCATION DESCRIPTION: well in employee parking lot
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO SPLIT SAMPLE NUMBER: _____
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 6.18'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1445 METHOD: bauler

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3 40ml VOA</u>	<u>4°C</u>	<u>8240 VOAS</u>

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE purged 11/19/91
SAMPLE pH _____ TIME sampled 11/20/91
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

<u>vol. purged</u>	<u>0 gal</u>	<u>5 gal</u>	<u>9 gal</u>	<u>15</u>
<u>Cond</u>	<u>1100</u>	<u>1070</u>	<u>1050</u>	<u>1000</u>
<u>temp</u>	<u>18.5</u>	<u>16.5</u>	<u>17.0</u>	<u>16</u>

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 2"
WATER LEVEL BEFORE 5.33' / 4.6 gal
WATER LEVEL AFTER dry
EST. VOLUME REMOVED 15 gal
HNU/OVA, BACKGROUND 0.2
HNU/OVA, WELL HEAD 0.2
COMMENTS _____
TIME STARTED _____
TIME COMPLETED _____
METHOD bauling
HNU/OVA, BREATHING ZONE BG



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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Keokuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-12, 12D PERSONNEL: D. Dees, D. Keokuk
LOCATION DESCRIPTION: Upgradient well
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: SP
SAMPLE SPLIT (circle one): YES NO: SPLIT SAMPLE NUMBER: split w/ IDNR
WATER LEVEL: Field Dup. VOA ± of Sample
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 12.27'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1235 METHOD: bauler

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40 ml VOA</u>	<u>4°C</u>	<u>8240 vols</u>
<u>3-40 ml VOA</u>	<u>4°C</u>	<u>8240 vols</u>

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE purged 11/20/91
SAMPLE pH _____ TIME sampled 11/20/91
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS vd. purged 0 5 9 11
cond 1200 1100 1070 925
temp 17.0°C 17.5 17.5 17.5

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER _____
WATER LEVEL BEFORE 7.96 43.51
35' per = 1.501
WATER LEVEL AFTER dry WELL DEPTH (SOUNDED) _____
EST. VOLUME REMOVED 11 gal TIME STARTED _____
HNU/OVA, BACKGROUND _____ TIME COMPLETED _____
HNU/OVA, WELL HEAD _____ METHOD _____
COMMENTS _____ HNU/OVA, BREATHING ZONE _____



WOODWARD-CLYDE CONSULTANTS

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(913) 432-4242

WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: S-G Hooker PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-13 PERSONNEL: JDG, D. Kocour
LOCATION DESCRIPTION: MW-13 in roadway
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: Split w/ IDA 12R
WATER LEVEL: - VOA'S
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 3.04'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1020 METHOD: bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40ml VOA</u>	<u>4°C</u>	<u>8240 volatiles</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

FIELD ANALYSIS - In. 7191

TEMPERATURE, °C _____ DATE purged 11/19/91
SAMPLE pH _____ TIME sampled 11/20/91
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS volume purged: 0 | 4 | 8 | 12 gal
pH 6.6 | 6.6 | 6.0 | 6.6
Cond. 105 x 10 | 130 x 10 | 130 x 10 | 125 x 10
temp. 17 | 18 | 19 | 18

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 2"
WATER LEVEL BEFORE 2.83 / 43' = WELL DEPTH (SOUNDED) 28' - installed depth
WATER LEVEL AFTER almost dry TIME STARTED _____
EST. VOLUME REMOVED 12 gal TIME COMPLETED _____
HNU/OVA, BACKGROUND 0.2 METHOD bailing
HNU/OVA, WELL HEAD 50-70 HNU/OVA, BREATHING ZONE _____
COMMENTS _____



WOODWARD-CLYDE CONSULTANTS

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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: SG Kookuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-14 PERSONNEL: D. Dods, D. Kocur
LOCATION DESCRIPTION: well at prop. line - downgradient
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: pld w/
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: EDR-VOAS
WATER LEVEL: _____
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 11.46 ft
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1050 METHOD: bailer

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40 ml VOA</u>	<u>4°C</u>	<u>8240 volatiles</u>

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE purged 11/19/91
SAMPLE pH _____ TIME sampled 11/20/91
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

<u>vol. purged</u>	<u>0</u>	<u>3.5</u>	<u>~7.5 ml - 12.5 ml</u>
<u>pH</u>	<u>12.00</u>	<u>12.80</u>	<u>12.30 12.50</u>
<u>cond</u>	<u>17</u>	<u>15.5</u>	<u>15 15</u>
<u>temp</u>			

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 2"
WATER LEVEL BEFORE 11.31' / = 3.5 gal
WATER LEVEL AFTER dry WELL DEPTH (SOUNDED) installed = 33'
EST. VOLUME REMOVED ~12.5 gal TIME STARTED _____
HNU/OVA, BACKGROUND 0.2 TIME COMPLETED _____
HNU/OVA, WELL HEAD 0.2 METHOD bailing
COMMENTS _____
HNU/OVA, BREATHING ZONE _____



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WATER SAMPLE COLLECTION FIELD SHEET

PROJECT NAME: S G Kedukuk PROJECT NUMBER: 91C7343
SAMPLE NUMBER: MW-15 PERSONNEL: D. Dees, D. Kercar
LOCATION DESCRIPTION: well at NE corner of employee lot
SAMPLE MEDIA (circle one): GROUNDWATER SURFACEWATER OTHER: _____
SAMPLE SPLIT (circle one): YES NO : SPLIT SAMPLE NUMBER: split w IDDR
WATER LEVEL: VOA's & semi vols
WATER LEVEL MEASUREMENT FROM TOP OF RISER PIPE: 3.13'
COLLECTION: YR: 91 MO: 11 DAY: 20 TIME: 1035 METHOD: bailey

SAMPLE CONTAINER	PRESERVATIVE	ANALYSIS REQUESTED
<u>3-40ml VOA</u>	<u>4°C</u>	<u>8240 vols.</u>

FIELD ANALYSIS

TEMPERATURE, °C _____ DATE purged 11/19/91
SAMPLE pH _____ TIME sampled 11/20/91
SALINITY, PARTS PER THOU _____ APPEARANCE _____
CONDUCTIVITY, umhos/cm _____ ODOR _____
pH BUFFER BEFORE _____ pH BUFFER AFTER _____
COMMENTS

vol. purged:	0	5	9.5 + dry
pH	5.7		
cond	2000	2100	2000
temp	15	17	16

DEVELOPMENT/PURGING

DATE _____ CASING DIAMETER 2'
WATER LEVEL BEFORE 3.89' = 4.73' WELL DEPTH (SOUNDED) instilled - 33'
WATER LEVEL AFTER dry TIME STARTED _____
EST. VOLUME REMOVED 9.5 gal TIME COMPLETED _____
HNU/OVA, BACKGROUND 0.2 METHOD _____
HNU/OVA, WELL HEAD 0.3 HNU/OVA, BREATHING ZONE _____
COMMENTS _____

APPENDIX F
ENSECO ANALYTICAL REPORTS

ANALYTICAL RESULTS
FOR
WOODWARD-CLYDE CONSULTANTS
ENSECO-RMAL NO. 019150



JANUARY 14, 1992

Reviewed by:

Debbie Fazio
Debbie Fazio

One

I. OVERVIEW

On November 22, 1991, Enseco-Rocky Mountain Analytical Laboratory received 23 samples from Woodward-Clyde Consultants.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- I. Overview
- II. Sample Description Information/Analytical Test Requests
- III. Analytical Results
- IV. Quality Control Report
 - A. Standard Enseco QC
 - B. Project-Specific QC

All analyses at Enseco are performed so that the maximum concentration of sample consistent with the method is analyzed. Dilutions are at times required to avoid saturation of the detector, to achieve linearity for a specific target compound or to reduce matrix interferences. In this event, reporting limits are adjusted proportionately. Surrogate compounds may not be measurable in samples which have been diluted.

Samples 019150-0002, -0003, -0004, -0005, -0007, -0010, and -0017 by Method 8240 were diluted due to interferences originating from non-target compounds. Samples 019150-0012 and -0013 by Method 8240 were diluted due to elevated concentrations of target compounds. All associated reporting limits were raised proportionately.

Sample 019150-0021 by Method 8240 was prepared as a medium level soil based on the screening data. No further dilutions were required for the final analysis. The reporting limits for sample 019150-0021 are nominal for medium level soils.

The extraction holding time for Method 8270 was exceeded for samples 019150-0023-SA and -0023-MS; this was due to an error in scheduling. Sample 019150-0023-SA was then reextracted and reanalyzed due to low acid surrogate recoveries in the original analysis. The reextraction produced improved surrogate recoveries and is, therefore, reported.

Two

II. SAMPLE DESCRIPTION INFORMATION/ANALYTICAL TEST REQUESTS

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

SAMPLE DESCRIPTION INFORMATION
for
Woodward-Clyde Consultants

Lab ID	Client ID	Matrix	Sampled Date	Time	Received Date
019150-0001-TB	TRIP BLANK	AQUEOUS	20 NOV 91		22 NOV 91
019150-0002-SA	MW-1	AQUEOUS	20 NOV 91	16:30	22 NOV 91
019150-0003-SA	MW-2	AQUEOUS	20 NOV 91	12:00	22 NOV 91
019150-0004-SA	MW-3	AQUEOUS	20 NOV 91	15:20	22 NOV 91
019150-0005-SA	MW-4	AQUEOUS	20 NOV 91	16:20	22 NOV 91
019150-0006-SA	MW-5	AQUEOUS	20 NOV 91	11:15	22 NOV 91
019150-0007-SA	MW-6A	AQUEOUS	20 NOV 91	11:40	22 NOV 91
019150-0008-SA	MW-6B	AQUEOUS	20 NOV 91	16:05	22 NOV 91
019150-0009-SA	MW-7	AQUEOUS	20 NOV 91	15:40	22 NOV 91
019150-0010-SA	MW-8	AQUEOUS	20 NOV 91	15:50	22 NOV 91
019150-0011-SA	MW-9	AQUEOUS	20 NOV 91	15:10	22 NOV 91
019150-0012-SA	MW-10	AQUEOUS	20 NOV 91	14:30	22 NOV 91
019150-0013-SA	MW-10D	AQUEOUS	20 NOV 91	14:30	22 NOV 91
019150-0014-SA	MW-11	AQUEOUS	20 NOV 91	14:45	22 NOV 91
019150-0015-SA	MW-12	AQUEOUS	20 NOV 91	12:35	22 NOV 91
019150-0016-SA	MW-12D	AQUEOUS	20 NOV 91	12:35	22 NOV 91
019150-0017-SA	MW-13	AQUEOUS	20 NOV 91	10:20	22 NOV 91
019150-0018-SA	MW-14	AQUEOUS	20 NOV 91	10:50	22 NOV 91
019150-0019-SA	MW-15	AQUEOUS	20 NOV 91	10:35	22 NOV 91
019150-0021-SA	S-MW-13	SOIL	20 NOV 91	16:50	22 NOV 91
019150-0021-MS	S-MW-13	SOIL	20 NOV 91	16:50	22 NOV 91
019150-0022-SA	S-MW-15	SOIL	20 NOV 91	16:50	22 NOV 91
019150-0023-SA	S-MW-13,14,15	SOIL	20 NOV 91	16:50	22 NOV 91
019150-0023-MS	S-MW-13,14,15	SOIL	20 NOV 91	16:50	22 NOV 91

ANALYTICAL TEST REQUESTS
for
Woodward-Clyde Consultants

Lab ID: 019150	Group Code	Analysis Description	Custom Test?
0001 - 0019	A	Volatile Organics	Y
		Target Compound List (TCL)	Y
		Screen - Volatile Organics	N
0022	C	Volatile Organics	Y
		Target Compound List (TCL)	Y
		GC Screen For Low Level Soils	N
0023	D	OTC Semivolatile Organics	N
		Prep - Semivolatile Organics by GC/MS, TCLP	N
		Leachate	
		TCLP Extraction / Extractable Organics & Metals	N
		pH	N
		Bulk Density	N
		% Free liquid, paint filter test	N
		Percent Water	N
		Cyanide, Reactive	N
		Sulfide, Reactive	N
		Total Organic Halogen (TOX)	N
		Phenolics (4-AAP)	N
0021	G	Volatile Organics	Y
		Target Compound List (TCL)	Y
		GC Screen For Low Level Soils	N
		OTC Volatile Organics	N
		Prep-Volatile Organics /API	N
		TCLP Extraction / Purgeable Volatile Organics	N

Three

III. ANALYTICAL RESULTS

The analytical results for this project are presented in the following data tables. The results are presented by sample, by test, with tests reported in the following order: GC/MS, Chromatography, Metals and Inorganics.

Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin. The date prepared is typically the date an extraction or digestion was initiated. For volatile organic compounds in water, the date prepared is the date the screening of the sample was performed.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, May, 1989.

In addition, surrogate recovery data is presented for all GC/MS analyses. The surrogate recovery is an indication of the affect of the sample matrix on the performance of the method. The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is given in Section IV.

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: TRIP BLANK

Lab ID: 019150-0001-TB

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	4.0	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene (total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	2.3	ug/L	5.0	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	1.3	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: TRIP BLANK

Lab ID: 019150-0001-TB

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	105	%
4-Bromofluorobenzene	94	%
1,2-Dichloroethane-d4	104	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
 Target Compound List (TCL)
 Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-1

Lab ID: 019150-0002-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit
Acetone	ND	ug/L	33000
Benzene	ND	ug/L	17000
Bromodichloromethane	ND	ug/L	17000
Bromoform	ND	ug/L	17000
Bromomethane	ND	ug/L	33000
2-Butanone (MEK)	ND	ug/L	33000
Carbon disulfide	ND	ug/L	17000
Carbon tetrachloride	ND	ug/L	17000
Chlorobenzene	ND	ug/L	17000
Chloroethane	ND	ug/L	33000
Chloroform	ND	ug/L	17000
Chloromethane	ND	ug/L	33000
Dibromochloromethane	ND	ug/L	17000
1,1-Dichloroethane	ND	ug/L	17000
1,2-Dichloroethane	ND	ug/L	17000
1,1-Dichloroethene	ND	ug/L	17000
1,2-Dichloroethene	ND	ug/L	17000
(total)	ND	ug/L	17000
1,2-Dichloropropane	ND	ug/L	17000
cis-1,3-Dichloropropene	ND	ug/L	17000
trans-1,3-Dichloropropene	ND	ug/L	17000
Ethylbenzene	ND	ug/L	17000
2-Hexanone	ND	ug/L	33000
Methylene chloride	13000	ug/L	17000
4-Methyl-2-pentanone			
(MIBK)	ND	ug/L	33000
Styrene	ND	ug/L	17000
1,1,2,2-Tetrachloroethane	ND	ug/L	17000
Tetrachloroethene	ND	ug/L	17000
Toluene	410000	ug/L	17000
1,1,1-Trichloroethane	ND	ug/L	17000
1,1,2-Trichloroethane	ND	ug/L	17000
Trichloroethene	ND	ug/L	17000
Vinyl acetate	ND	ug/L	33000
Vinyl chloride	ND	ug/L	33000
Xylenes (total)	ND	ug/L	17000
Hexane	3300	ug/L	--
n-Butyl alcohol	ND	ug/L	--
Isobutanol	ND	ug/L	670000

J

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-1

Lab ID: 019150-0002-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8

106 %

4-Bromofluorobenzene

98 %

1,2-Dichloroethane-d4

106 %

Note J : Result is detected below the reporting limit or is an
estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
 Target Compound List (TCL)
 Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-2

Lab ID: 019150-0003-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	12000	ug/L	33000	J
Benzene	ND	ug/L	17000	
Bromodichloromethane	ND	ug/L	17000	
Bromoform	ND	ug/L	17000	
Bromomethane	ND	ug/L	33000	
2-Butanone (MEK)	ND	ug/L	33000	
Carbon disulfide	ND	ug/L	17000	
Carbon tetrachloride	ND	ug/L	17000	
Chlorobenzene	ND	ug/L	17000	
Chloroethane	ND	ug/L	33000	
Chloroform	ND	ug/L	17000	
Chloromethane	ND	ug/L	33000	
Dibromochloromethane	ND	ug/L	17000	
1,1-Dichloroethane	ND	ug/L	17000	
1,2-Dichloroethane	ND	ug/L	17000	
1,1-Dichloroethene	ND	ug/L	17000	
1,2-Dichloroethene (total)	ND	ug/L	17000	
1,2-Dichloropropane	ND	ug/L	17000	
cis-1,3-Dichloropropene	ND	ug/L	17000	
trans-1,3-Dichloropropene	ND	ug/L	17000	
Ethylbenzene	ND	ug/L	17000	
2-Hexanone	ND	ug/L	33000	
Methylene chloride	23000	ug/L	17000	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	33000	
Styrene	ND	ug/L	17000	
1,1,2,2-Tetrachloroethane	ND	ug/L	17000	
Tetrachloroethene	ND	ug/L	17000	
Toluene	410000	ug/L	17000	
1,1,1-Trichloroethane	ND	ug/L	17000	
1,1,2-Trichloroethane	ND	ug/L	17000	
Trichloroethene	ND	ug/L	17000	
Vinyl acetate	ND	ug/L	33000	
Vinyl chloride	ND	ug/L	33000	
Xylenes (total)	ND	ug/L	17000	
Hexane	4600	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	670000	

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-2

Lab ID: 019150-0003-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	102	%
4-Bromofluorobenzene	93	%
1,2-Dichloroethane-d4	109	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
 Target Compound List (TCL)
 Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-3

Lab ID: 019150-0004-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	33	ug/L	20	
Benzene	ND	ug/L	10	
Bromodichloromethane	ND	ug/L	10	
Bromoform	ND	ug/L	10	
Bromomethane	ND	ug/L	20	
2-Butanone (MEK)	7.5	ug/L	20	J
Carbon disulfide	ND	ug/L	10	
Carbon tetrachloride	ND	ug/L	10	
Chlorobenzene	ND	ug/L	10	
Chloroethane	ND	ug/L	20	
Chloroform	ND	ug/L	10	
Chloromethane	ND	ug/L	20	
Dibromochloromethane	ND	ug/L	10	
1,1-Dichloroethane	ND	ug/L	10	
1,2-Dichloroethane	ND	ug/L	10	
1,1-Dichloroethene	ND	ug/L	10	
1,2-Dichloroethene (total)	ND	ug/L	10	
1,2-Dichloropropane	ND	ug/L	10	
cis-1,3-Dichloropropene	ND	ug/L	10	
trans-1,3-Dichloropropene	ND	ug/L	10	
Ethylbenzene	ND	ug/L	10	
2-Hexanone	ND	ug/L	20	
Methylene chloride	4.3	ug/L	10	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	20	
Styrene	ND	ug/L	10	
1,1,2,2-Tetrachloroethane	ND	ug/L	10	
Tetrachloroethene	ND	ug/L	10	
Toluene	170	ug/L	10	
1,1,1-Trichloroethane	ND	ug/L	10	
1,1,2-Trichloroethane	ND	ug/L	10	
Trichloroethene	ND	ug/L	10	
Vinyl acetate	ND	ug/L	20	
Vinyl chloride	ND	ug/L	20	
Xylenes (total)	ND	ug/L	10	
Hexane	ND	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	400	

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-3

Lab ID: 019150-0004-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	106	%
4-Bromofluorobenzene	95	%
1,2-Dichloroethane-d4	104	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-4

Lab ID: 019150-0005-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit
Acetone	220	ug/L	100
Benzene	ND	ug/L	50
Bromodichloromethane	ND	ug/L	50
Bromoform	ND	ug/L	50
Bromomethane	ND	ug/L	100
2-Butanone (MEK)	ND	ug/L	100
Carbon disulfide	ND	ug/L	50
Carbon tetrachloride	ND	ug/L	50
Chlorobenzene	ND	ug/L	50
Chloroethane	ND	ug/L	100
Chloroform	ND	ug/L	50
Chloromethane	ND	ug/L	100
Dibromochloromethane	ND	ug/L	50
1,1-Dichloroethane	ND	ug/L	50
1,2-Dichloroethane	ND	ug/L	50
1,1-Dichloroethene	ND	ug/L	50
1,2-Dichloroethene	ND	ug/L	50
(total)	ND	ug/L	50
1,2-Dichloropropane	ND	ug/L	50
cis-1,3-Dichloropropene	ND	ug/L	50
trans-1,3-Dichloropropene	ND	ug/L	50
Ethylbenzene	ND	ug/L	50
2-Hexanone	ND	ug/L	100
Methylene chloride	24	ug/L	50
4-Methyl-2-pentanone	ND	ug/L	100
(MIBK)	ND	ug/L	50
Styrene	ND	ug/L	50
1,1,2,2-Tetrachloroethane	ND	ug/L	50
Tetrachloroethene	ND	ug/L	50
Toluene	770	ug/L	50
1,1,1-Trichloroethane	ND	ug/L	50
1,1,2-Trichloroethane	ND	ug/L	50
Trichloroethene	ND	ug/L	50
Vinyl acetate	ND	ug/L	100
Vinyl chloride	ND	ug/L	100
Xylenes (total)	ND	ug/L	50
Hexane	13	ug/L	--
n-Butyl alcohol	ND	ug/L	--
Isobutanol	ND	ug/L	2000

J

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-4

Lab ID: 019150-0005-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8

102 %

4-Bromofluorobenzene

93 %

1,2-Dichloroethane-d4

107 %

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

**Volatile Organics
Target Compound List (TCL)
Method 8240**

Client Name: Woodward-Clyde Consultants

Client ID: MW-5

Lab ID: 019150-0006-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 04 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	ND	ug/L	10	
Benzene	1.6	ug/L	5.0	J
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	2.6	ug/L	5.0	J
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	45	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene (total)	3.1	ug/L	5.0	J
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	1.1	ug/L	5.0	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	1.0	ug/L	5.0	J
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	26	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	1.5	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Cesar Rojas

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-5

Lab ID: 019150-0006-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 04 DEC 91

Surrogate

Recovery

Toluene-d8	102	%
4-Bromofluorobenzene	102	%
1,2-Dichloroethane-d4	101	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Cesar Rojas

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-6A

Lab ID: 019150-0007-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	1500	ug/L	2500	J
Benzene	ND	ug/L	1200	
Bromodichloromethane	ND	ug/L	1200	
Bromoform	ND	ug/L	1200	
Bromomethane	ND	ug/L	2500	
2-Butanone (MEK)	ND	ug/L	2500	
Carbon disulfide	ND	ug/L	1200	
Carbon tetrachloride	ND	ug/L	1200	
Chlorobenzene	ND	ug/L	1200	
Chloroethane	ND	ug/L	2500	
Chloroform	ND	ug/L	1200	
Chloromethane	ND	ug/L	2500	
Dibromochloromethane	ND	ug/L	1200	
1,1-Dichloroethane	ND	ug/L	1200	
1,2-Dichloroethane	ND	ug/L	1200	
1,1-Dichloroethene	ND	ug/L	1200	
1,2-Dichloroethene	ND	ug/L	1200	
(total)	ND	ug/L	1200	
1,2-Dichloropropane	ND	ug/L	1200	
cis-1,3-Dichloropropene	ND	ug/L	1200	
trans-1,3-Dichloropropene	ND	ug/L	1200	
Ethylbenzene	19000	ug/L	1200	
2-Hexanone	ND	ug/L	2500	
Methylene chloride	850	ug/L	1200	J
4-Methyl-2-pentanone	ND	ug/L	2500	
(MIBK)	ND	ug/L	1200	
Styrene	ND	ug/L	1200	
1,1,2,2-Tetrachloroethane	ND	ug/L	1200	
Tetrachloroethene	ND	ug/L	1200	
Toluene	18000	ug/L	1200	
1,1,1-Trichloroethane	ND	ug/L	1200	
1,1,2-Trichloroethane	ND	ug/L	1200	
Trichloroethene	ND	ug/L	1200	
Vinyl acetate	ND	ug/L	2500	
Vinyl chloride	ND	ug/L	2500	
Xylenes (total)	57000	ug/L	1200	
Hexane	440	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	50000	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-6A

Lab ID: 019150-0007-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	103	%
4-Bromofluorobenzene	96	%
1,2-Dichloroethane-d4	104	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-6B

Lab ID: 019150-0008-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	69	ug/L	10	
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	25	ug/L	10	
Carbon disulfide	4.0	ug/L	5.0	J
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	2.1	ug/L	5.0	J
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene (total)	5.7	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	4.6	ug/L	5.0	J
2-Hexanone	ND	ug/L	10	
Methylene chloride	3.2	ug/L	5.0	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	3.4	ug/L	5.0	J
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	3.8	ug/L	5.0	J
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	66	ug/L	5.0	
Hexane	1.3	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-6B

Lab ID: 019150-0008-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	102	%
4-Bromofluorobenzene	94	%
1,2-Dichloroethane-d4	103	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Cherie Windholz

Approved By: Mark Dymerski

**Volatile Organics
 Target Compound List (TCL)
 Method 8240**

Client Name: Woodward-Clyde Consultants

Client ID: MW-7

Lab ID: 019150-0009-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	3.0	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	16	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene				
(total)	16	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	2.7	ug/L	5.0	J
4-Methyl-2-pentanone				
(MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	2.2	ug/L	5.0	J
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	8.5	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	4.1	ug/L	10	J
Xylenes (total)	ND	ug/L	5.0	
Hexane	1.2	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-7

Lab ID: 019150-0009-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	101	%
4-Bromofluorobenzene	107	%
1,2-Dichloroethane-d4	98	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-8

Lab ID: 019150-0010-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 05 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	ND	ug/L	25	
Benzene	ND	ug/L	12	
Bromodichloromethane	ND	ug/L	12	
Bromoform	ND	ug/L	12	
Bromomethane	ND	ug/L	25	
2-Butanone (MEK)	ND	ug/L	25	
Carbon disulfide	ND	ug/L	12	
Carbon tetrachloride	43	ug/L	12	
Chlorobenzene	ND	ug/L	12	
Chloroethane	ND	ug/L	25	
Chloroform	9.8	ug/L	12	J
Chloromethane	ND	ug/L	25	
Dibromochloromethane	ND	ug/L	12	
1,1-Dichloroethane	ND	ug/L	12	
1,2-Dichloroethane	ND	ug/L	12	
1,1-Dichloroethene	ND	ug/L	12	
1,2-Dichloroethene (total)	75	ug/L	12	
1,2-Dichloropropane	ND	ug/L	12	
cis-1,3-Dichloropropene	ND	ug/L	12	
trans-1,3-Dichloropropene	ND	ug/L	12	
Ethylbenzene	ND	ug/L	12	
2-Hexanone	ND	ug/L	25	
Methylene chloride	4.0	ug/L	12	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	25	
Styrene	ND	ug/L	12	
1,1,2,2-Tetrachloroethane	ND	ug/L	12	
Tetrachloroethene	86	ug/L	12	
Toluene	ND	ug/L	12	
1,1,1-Trichloroethane	ND	ug/L	12	
1,1,2-Trichloroethane	ND	ug/L	12	
Trichloroethene	84	ug/L	12	
Vinyl acetate	ND	ug/L	25	
Vinyl chloride	ND	ug/L	25	
Xylenes (total)	ND	ug/L	12	
Hexane	ND	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	500	

(continued on following page)

ND = Not detected

NA = Not applicable

Reported By: Jon Danaceau

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-8

Lab ID: 019150-0010-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 05 DEC 91

Surrogate

Recovery

Toluene-d8	103	%
4-Bromofluorobenzene	100	%
1,2-Dichloroethane-d4	105	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Jon Danaceau

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-9

Lab ID: 019150-0011-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	3.6	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	1.8	ug/L	5.0	J
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	1.3	ug/L	5.0	J
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene (total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	2.5	ug/L	5.0	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	2.7	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-9

Lab ID: 019150-0011-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	105	%
4-Bromofluorobenzene	101	%
1,2-Dichloroethane-d4	104	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

**Volatile Organics
Target Compound List (TCL)
Method 8240**

Client Name: Woodward-Clyde Consultants

Client ID: MW-10

Lab ID: 019150-0012-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	450	ug/L	1000	J
Benzene	ND	ug/L	500	
Bromodichloromethane	ND	ug/L	500	
Bromoform	ND	ug/L	500	
Bromomethane	ND	ug/L	1000	
2-Butanone (MEK)	ND	ug/L	1000	
Carbon disulfide	ND	ug/L	500	
Carbon tetrachloride	ND	ug/L	500	
Chlorobenzene	ND	ug/L	500	
Chloroethane	ND	ug/L	1000	
Chloroform	ND	ug/L	500	
Chloromethane	ND	ug/L	1000	
Dibromochloromethane	ND	ug/L	500	
1,1-Dichloroethane	ND	ug/L	500	
1,2-Dichloroethane	ND	ug/L	500	
1,1-Dichloroethene	540	ug/L	500	
1,2-Dichloroethene				
(total)	110	ug/L	500	J
1,2-Dichloropropane	ND	ug/L	500	
cis-1,3-Dichloropropene	ND	ug/L	500	
trans-1,3-Dichloropropene	ND	ug/L	500	
Ethylbenzene	140	ug/L	500	J
2-Hexanone	ND	ug/L	1000	
Methylene chloride	11000	ug/L	500	
4-Methyl-2-pentanone				
(MIBK)	ND	ug/L	1000	
Styrene	ND	ug/L	500	
1,1,2,2-Tetrachloroethane	ND	ug/L	500	
Tetrachloroethene	810	ug/L	500	
Toluene	1000	ug/L	500	
1,1,1-Trichloroethane	1600	ug/L	500	
1,1,2-Trichloroethane	ND	ug/L	500	
Trichloroethene	2000	ug/L	500	
Vinyl acetate	ND	ug/L	1000	
Vinyl chloride	ND	ug/L	1000	
Xylenes (total)	360	ug/L	500	J
Hexane	220	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	20000	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Paul Winkler

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-10

Lab ID: 019150-0012-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate	Recovery	
Toluene-d8	110	%
4-Bromofluorobenzene	108	%
1,2-Dichloroethane-d4	104	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Paul Winkler

Volatile Organics
 Target Compound List (TCL)
 Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-10D

Lab ID: 019150-0013-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	620	ug/L	1000	J
Benzene	ND	ug/L	500	
Bromodichloromethane	ND	ug/L	500	
Bromoform	ND	ug/L	500	
Bromomethane	ND	ug/L	1000	
2-Butanone (MEK)	ND	ug/L	1000	
Carbon disulfide	ND	ug/L	500	
Carbon tetrachloride	ND	ug/L	500	
Chlorobenzene	ND	ug/L	500	
Chloroethane	ND	ug/L	1000	
Chloroform	ND	ug/L	500	
Chloromethane	ND	ug/L	1000	
Dibromochloromethane	ND	ug/L	500	
1,1-Dichloroethane	ND	ug/L	500	
1,2-Dichloroethane	ND	ug/L	500	
1,1-Dichloroethene	680	ug/L	500	
1,2-Dichloroethene (total)	ND	ug/L	500	
1,2-Dichloropropane	ND	ug/L	500	
cis-1,3-Dichloropropene	ND	ug/L	500	
trans-1,3-Dichloropropene	ND	ug/L	500	
Ethylbenzene	120	ug/L	500	J
2-Hexanone	ND	ug/L	1000	
Methylene chloride	11000	ug/L	500	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	1000	
Styrene	ND	ug/L	500	
1,1,2,2-Tetrachloroethane	ND	ug/L	500	
Tetrachloroethene	740	ug/L	500	
Toluene	910	ug/L	500	
1,1,1-Trichloroethane	1500	ug/L	500	
1,1,2-Trichloroethane	ND	ug/L	500	
Trichloroethene	2000	ug/L	500	
Vinyl acetate	ND	ug/L	1000	
Vinyl chloride	ND	ug/L	1000	
Xylenes (total)	220	ug/L	500	J
Hexane	210	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	20000	

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Steve Siegel

Approved By: Paul Winkler

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-10D

Lab ID: 019150-0013-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	102	%
4-Bromofluorobenzene	110	%
1,2-Dichloroethane-d4	103	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Paul Winkler

Volatile Organics
 Target Compound List (TCL)
 Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-11

Lab ID: 019150-0014-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	4.7	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene (total)	6.4	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	2.6	ug/L	5.0	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	3.2	ug/L	5.0	J
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	2.3	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
 NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-11

Lab ID: 019150-0014-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	103	%
4-Bromofluorobenzene	108	%
1,2-Dichloroethane-d4	101	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-12

Lab ID: 019150-0015-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	4.2	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene				
(total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	2.8	ug/L	5.0	J
4-Methyl-2-pentanone				
(MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	3.9	ug/L	5.0	J
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	2.3	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants
Client ID: MW-12
Lab ID: 019150-0015-SA
Matrix: AQUEOUS
Authorized: 22 NOV 91

Sampled: 20 NOV 91
Prepared: 22 NOV 91

Received: 22 NOV 91
Analyzed: 03 DEC 91

Surrogate	Recovery	
Toluene-d8	106	%
4-Bromofluorobenzene	109	%
1,2-Dichloroethane-d4	101	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-12D

Lab ID: 019150-0016-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	3.5	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene	ND	ug/L	5.0	
(total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	2.7	ug/L	5.0	J
4-Methyl-2-pentanone	ND	ug/L	10	
(MIBK)	ND	ug/L	5.0	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	4.2	ug/L	5.0	J
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	2.3	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-12D

Lab ID: 019150-0016-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	105	%
4-Bromofluorobenzene	103	%
1,2-Dichloroethane-d4	103	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-13

Lab ID: 019150-0017-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	3200	ug/L	5000	J
Benzene	ND	ug/L	2500	
Bromodichloromethane	ND	ug/L	2500	
Bromoform	ND	ug/L	2500	
Bromomethane	ND	ug/L	5000	
2-Butanone (MEK)	1600	ug/L	5000	J
Carbon disulfide	ND	ug/L	2500	
Carbon tetrachloride	ND	ug/L	2500	
Chlorobenzene	ND	ug/L	2500	
Chloroethane	ND	ug/L	5000	
Chloroform	ND	ug/L	2500	
Chloromethane	ND	ug/L	5000	
Dibromochloromethane	ND	ug/L	2500	
1,1-Dichloroethane	ND	ug/L	2500	
1,2-Dichloroethane	ND	ug/L	2500	
1,1-Dichloroethene	1200	ug/L	2500	J
1,2-Dichloroethene				
(total)	780	ug/L	2500	J
1,2-Dichloropropane	ND	ug/L	2500	
cis-1,3-Dichloropropene	ND	ug/L	2500	
trans-1,3-Dichloropropene	ND	ug/L	2500	
Ethylbenzene	1200	ug/L	2500	J
2-Hexanone	ND	ug/L	5000	
Methylene chloride	55000	ug/L	2500	
4-Methyl-2-pentanone				
(MIBK)	ND	ug/L	5000	
Styrene	ND	ug/L	2500	
1,1,2,2-Tetrachloroethane	ND	ug/L	2500	
Tetrachloroethene	2100	ug/L	2500	J
Toluene	31000	ug/L	2500	
1,1,1-Trichloroethane	2100	ug/L	2500	J
1,1,2-Trichloroethane	ND	ug/L	2500	
Trichloroethene	5500	ug/L	2500	
Vinyl acetate	ND	ug/L	5000	
Vinyl chloride	ND	ug/L	5000	
Xylenes (total)	2700	ug/L	2500	
Hexane	880	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	100000	

(continued on following page)

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-13

Lab ID: 019150-0017-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	103	%
4-Bromofluorobenzene	106	%
1,2-Dichloroethane-d4	99	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-14

Lab ID: 019150-0018-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	ND	ug/L	10	
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene	ND	ug/L	5.0	
(total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	3.0	ug/L	5.0	J
4-Methyl-2-pentanone	ND	ug/L	10	
(MIBK)	ND	ug/L	5.0	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	2.2	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-14

Lab ID: 019150-0018-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	98	%
4-Bromofluorobenzene	102	%
1,2-Dichloroethane-d4	94	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-15

Lab ID: 019150-0019-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Units	Reporting Limit	
Acetone	5.6	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	3.4	ug/L	5.0	J
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	7.9	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	1.1	ug/L	5.0	J
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene (total)	14	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	3.0	ug/L	5.0	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	8.4	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	2.0	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

(continued on following page)

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: MW-15

Lab ID: 019150-0019-SA

Matrix: AQUEOUS

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 22 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	103	%
4-Bromofluorobenzene	101	%
1,2-Dichloroethane-d4	94	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: S-MW-13

Lab ID: 019150-0021-SA

Matrix: SOIL

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 27 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Parameter	Result	Wet wt. Units	Reporting Limit	
Acetone	210	ug/kg	1000	J
Benzene	ND	ug/kg	500	
Bromodichloromethane	ND	ug/kg	500	
Bromoform	ND	ug/kg	500	
Bromomethane	ND	ug/kg	1000	
2-Butanone (MEK)	ND	ug/kg	1000	
Carbon disulfide	ND	ug/kg	500	
Carbon tetrachloride	ND	ug/kg	500	
Chlorobenzene	ND	ug/kg	500	
Chloroethane	ND	ug/kg	1000	
Chloroform	ND	ug/kg	500	
Chloromethane	ND	ug/kg	1000	
Dibromochloromethane	ND	ug/kg	500	
1,1-Dichloroethane	ND	ug/kg	500	
1,2-Dichloroethane	ND	ug/kg	500	
1,1-Dichloroethene	ND	ug/kg	500	
1,2-Dichloroethene (total)	ND	ug/kg	500	
1,2-Dichloropropane	ND	ug/kg	500	
cis-1,3-Dichloropropene	ND	ug/kg	500	
trans-1,3-Dichloropropene	ND	ug/kg	500	
Ethylbenzene	190	ug/kg	500	J
2-Hexanone	ND	ug/kg	1000	
Methylene chloride	910	ug/kg	500	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	1000	
Styrene	ND	ug/kg	500	
1,1,2,2-Tetrachloroethane	ND	ug/kg	500	
Tetrachloroethene	ND	ug/kg	500	
Toluene	570	ug/kg	500	
1,1,1-Trichloroethane	ND	ug/kg	500	
1,1,2-Trichloroethane	ND	ug/kg	500	
Trichloroethene	ND	ug/kg	500	
Vinyl acetate	ND	ug/kg	1000	
Vinyl chloride	ND	ug/kg	1000	
Xylenes (total)	1600	ug/kg	500	
Hexane	160	ug/kg	--	
n-Butyl alcohol	ND	ug/kg	--	
Isobutanol	ND	ug/kg	20000	

(continued on following page)

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: S-MW-13

Lab ID: 019150-0021-SA

Matrix: SOIL

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 27 NOV 91

Received: 22 NOV 91

Analyzed: 03 DEC 91

Surrogate

Recovery

Toluene-d8	101	%
4-Bromofluorobenzene	109	%
1,2-Dichloroethane-d4	94	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Steve Siegel

Approved By: Mark Dymerski

OTC Volatile Organics
TCLP Leachate
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: S-MW-13

Lab ID: 019150-0021-SA

Matrix: SOIL

Sampled: 20 NOV 91

Received: 22 NOV 91

Authorized: 22 NOV 91

Leached: 26 NOV 91

Prepared: 27 NOV 91

Analyzed: 10 DEC 91

Parameter	Result	Units	Reporting Limit
Vinyl chloride	ND	mg/L	0.050
1,1-Dichloroethene	ND	mg/L	0.025
Chloroform	ND	mg/L	0.025
1,2-Dichloroethane	ND	mg/L	0.025
2-Butanone	ND	mg/L	0.050
Carbon tetrachloride	ND	mg/L	0.025
Trichloroethene	ND	mg/L	0.025
Benzene	ND	mg/L	0.025
Tetrachloroethene	ND	mg/L	0.025
Chlorobenzene	ND	mg/L	0.025

Surrogate	Recovery
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Toluene-d8	102	%
4-Bromofluorobenzene	101	%
1,2-Dichloroethane-d4	93	%

ND = Not detected
NA = Not applicable

Reported By: Jon Danaceau

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: S-MW-15

Lab ID: 019150-0022-SA

Matrix: SOIL

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 25 NOV 91

Received: 22 NOV 91

Analyzed: 04 DEC 91

Parameter	Result	Wet wt. Units	Reporting Limit	
Acetone	ND	ug/kg	10	
Benzene	ND	ug/kg	5.0	
Bromodichloromethane	ND	ug/kg	5.0	
Bromoform	ND	ug/kg	5.0	
Bromomethane	ND	ug/kg	10	
2-Butanone (MEK)	ND	ug/kg	10	
Carbon disulfide	ND	ug/kg	5.0	
Carbon tetrachloride	ND	ug/kg	5.0	
Chlorobenzene	ND	ug/kg	5.0	
Chloroethane	ND	ug/kg	10	
Chloroform	ND	ug/kg	5.0	
Chloromethane	ND	ug/kg	10	
Dibromochloromethane	ND	ug/kg	5.0	
1,1-Dichloroethane	ND	ug/kg	5.0	
1,2-Dichloroethane	ND	ug/kg	5.0	
1,1-Dichloroethene	ND	ug/kg	5.0	
1,2-Dichloroethene				
(total)	ND	ug/kg	5.0	
1,2-Dichloropropane	ND	ug/kg	5.0	
cis-1,3-Dichloropropene	ND	ug/kg	5.0	
trans-1,3-Dichloropropene	ND	ug/kg	5.0	
Ethylbenzene	ND	ug/kg	5.0	
2-Hexanone	ND	ug/kg	10	
Methylene chloride	2.7	ug/kg	5.0	J
4-Methyl-2-pentanone				
(MIBK)	ND	ug/kg	10	
Styrene	ND	ug/kg	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.0	
Tetrachloroethene	ND	ug/kg	5.0	
Toluene	1.2	ug/kg	5.0	J
1,1,1-Trichloroethane	ND	ug/kg	5.0	
1,1,2-Trichloroethane	ND	ug/kg	5.0	
Trichloroethene	ND	ug/kg	5.0	
Vinyl acetate	ND	ug/kg	10	
Vinyl chloride	ND	ug/kg	10	
Xylenes (total)	ND	ug/kg	5.0	
Hexane	2.8	ug/kg	--	
n-Butyl alcohol	ND	ug/kg	--	
Isobutanol	ND	ug/kg	200	

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Michael Blades

Approved By: Mark Dymerski

Volatile Organics
Target Compound List (TCL)
Method 8240

Client Name: Woodward-Clyde Consultants

Client ID: S-MW-15

Lab ID: 019150-0022-SA

Matrix: SOIL

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: 25 NOV 91

Received: 22 NOV 91

Analyzed: 04 DEC 91

Surrogate

Recovery

Toluene-d8	101	%
4-Bromofluorobenzene	98	%
1,2-Dichloroethane-d4	99	%

Note J : Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

NA = Not applicable

Reported By: Michael Blades

Approved By: Mark Dymerski

OTC Semivolatile Organics
TCLP Leachate
Method 8270

Client Name: Woodward-Clyde Consultants

Client ID: S-MW-13,14,15

Lab ID: 019150-0023-SA

Matrix: SOIL

Sampled: 20 NOV 91

Received: 22 NOV 91

Authorized: 22 NOV 91

Leached: 24 NOV 91

Prepared: 10 JAN 92

Analyzed: 13 JAN 92

Parameter	Result	Dry weight Units	Reporting Limit
Pyridine	ND	mg/L	0.12
1,4-Dichlorobenzene	ND	mg/L	0.061
2-Methylphenol	ND	mg/L	0.061
3/4-Methylphenol	ND	mg/L	0.061
Hexachloroethane	ND	mg/L	0.061
Nitrobenzene	ND	mg/L	0.061
Hexachlorobutadiene	ND	mg/L	0.061
2,4,6-Trichlorophenol	ND	mg/L	0.061
2,4,5-Trichlorophenol	ND	mg/L	0.31
2,4-Dinitrotoluene	ND	mg/L	0.061
Hexachlorobenzene	ND	mg/L	0.061
Pentachlorophenol	ND	mg/L	0.31

Surrogate	Recovery	
Nitrobenzene-d5	74	%
2-Fluorobiphenyl	69	%
Terphenyl-d14	62	%
Phenol-d5	36	%
2-Fluorophenol	29	%
2,4,6-Tribromophenol	45	%

Percent Moisture is 18.6%. All results and limits are reported on a dry weight basis.

ND = Not detected
NA = Not applicable

Reported By: Robert Sprengeler

Approved By: Paul Winkler

General Inorganics

Client Name: Woodward-Clyde Consultants

Client ID: S-MW-13,14,15

Lab ID: 019150-0023-SA

Matrix: SOIL

Authorized: 22 NOV 91

Sampled: 20 NOV 91

Prepared: See Below

Received: 22 NOV 91

Analyzed: See Below

Parameter	Result	Dry weight Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Reactive	ND	mg/kg	0.12	EPA/OSW	NA	08 DEC 91
pH	7.8	units	--	9045	NA	10 DEC 91
Phenolics	ND	mg/kg	0.61	9065	NA	05 DEC 91
Sulfide, Reactive	ND	mg/kg	0.61	EPA/OSW	NA	06 DEC 91
Total Organic Halogen as Cl	ND	mg/kg	0.37	9020	NA	26 DEC 91

Percent Moisture is 18.6%. All results and limits are reported on a dry weight basis.

ND = Not detected

NA = Not applicable

Reported By: Ron Maiorana

Approved By: Dan Appelhans

IV. QUALITY CONTROL REPORT

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco-Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

A. Standard Enseco QC

The standard laboratory QC package is designed to:

- 1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data
- 2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix
- 3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and
- 4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery \pm 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g., metals or conventional analyses) a single DCS serves as the control sample. An SCS is prepared for each sample lot for which the DCS pair are not analyzed. The recovery of the SCS is charted in exactly the same manner as described for the DCS, and provides a daily check on the performance of the method.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

B. Project-Specific QC

With this project, additional QC was requested in the form of duplicate sample analyses and/or spiked sample analyses. The use of an actual sample as the QC matrix is termed "project-specific" QC.

Project-specific QC is valuable in assessing the affect of the sample matrix on the performance of the analytical method. No QC limits for accuracy and precision are assigned to data generated on actual sample matrices due to the variability of the matrix.

The results of the duplicate and spike sample analyses follow. For matrix spike analyses, the project specific QC results contain the analytical results from both analyses along with the spike level and percent recovery. The percent recovery calculation is not performed if the spike level is less than or equal to 50% of the value in the sample.

For duplicate analyses, the results from both the analyses are reported along with the relative percent difference (RPD). An RPD is not calculated if one of the results is reported as ND.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
019150-0001-TB	AQUEOUS	624-A	20 NOV 91-D	03 DEC 91-D
019150-0002-SA	AQUEOUS	624-A	20 NOV 91-D	03 DEC 91-D
019150-0003-SA	AQUEOUS	624-A	20 NOV 91-D	03 DEC 91-D
019150-0004-SA	AQUEOUS	624-A	20 NOV 91-D	03 DEC 91-D
019150-0005-SA	AQUEOUS	624-A	20 NOV 91-D	03 DEC 91-D
019150-0006-SA	AQUEOUS	624-A	27 NOV 91-D	03 DEC 91-D2
019150-0007-SA	AQUEOUS	624-A	20 NOV 91-D	03 DEC 91-D
019150-0008-SA	AQUEOUS	624-A	27 NOV 91-D	03 DEC 91-D
019150-0009-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0010-SA	AQUEOUS	624-A	03 DEC 91-B	04 DEC 91-B2
019150-0011-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0012-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0013-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0014-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0015-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0016-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0017-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0018-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0019-SA	AQUEOUS	624-A	22 NOV 91-F	03 DEC 91-F
019150-0021-SA	SOIL	8240-S	27 NOV 91-A	27 NOV 91-B
019150-0021-SA	LEACHATE	VOA-MS-TL	09 DEC 91-LT	10 DEC 91-LT
019150-0021-MS	LEACHATE	VOA-MS-TL	09 DEC 91-LT	10 DEC 91-LT
019150-0022-SA	SOIL	8240-SL	02 DEC 91-J	04 DEC 91-J

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		Average(%) DCS	Limits	(RPD) DCS	Limit
Category: 624-A								
Matrix: AQUEOUS								
QC Lot: 20 NOV 91-D								
Concentration Units: ug/L								
1,1-Dichloroethene	50	51.3	52.3	51.8	104	56-138	1.9	20
Trichloroethene	50	52.1	51.5	51.8	104	76-109	1.2	13
Benzene	50	58.7	56.7	57.7	115	78-119	3.5	12
Toluene	50	61.3	52.2	56.8	114	82-114	16	13
Chlorobenzene	50	51.3	50.6	51.0	102	84-117	1.4	10

Category: 624-A
Matrix: AQUEOUS
QC Lot: 27 NOV 91-D
Concentration Units: ug/L

1,1-Dichloroethene	50	40.0	41.3	40.6	81	56-138	3.2	20
Trichloroethene	50	43.8	48.1	46.0	92	76-109	9.4	13
Benzene	50	48.5	54.5	51.5	103	78-119	12	12
Toluene	50	47.0	52.2	49.6	99	82-114	10	13
Chlorobenzene	50	47.9	52.5	50.2	100	84-117	9.2	10

Category: 624-A
Matrix: AQUEOUS
QC Lot: 22 NOV 91-F
Concentration Units: ug/L

1,1-Dichloroethene	50	67.5	62.0	64.8	130	56-138	8.5	20
Trichloroethene	50	42.9	46.4	44.6	89	76-109	7.8	13
Benzene	50	52.1	54.2	53.2	106	78-119	4.0	12
Toluene	50	50.6	50.4	50.5	101	82-114	0.4	13
Chlorobenzene	50	51.5	51.6	51.6	103	84-117	0.2	10

Category: 624-A
Matrix: AQUEOUS
QC Lot: 03 DEC 91-B
Concentration Units: ug/L

1,1-Dichloroethene	50	41.2	48.8	45.0	90	56-138	17	20
Trichloroethene	50	44.4	45.1	44.8	90	76-109	1.6	13
Benzene	50	50.2	51.9	51.0	102	78-119	3.3	12
Toluene	50	44.8	48.8	46.8	94	82-114	8.5	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		DCS	Average (%) Limits	(RPD)	DCS Limit

Category: 624-A
Matrix: AQUEOUS
QC Lot: 03 DEC 91-B
Concentration Units: ug/L

Chlorobenzene	50	49.2	57.6	53.4	107	84-117	16	10
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Category: 8240-S
Matrix: SOIL
QC Lot: 27 NOV 91-A
Concentration Units: ug/kg

1,1-Dichloroethene	5000	3970	4010	3990	80	53-120	1.0	21
Trichloroethene	5000	4640	4620	4630	93	70-118	0.4	16
Benzene	5000	5020	5190	5100	102	74-129	3.3	17
Toluene	5000	4800	4680	4740	95	76-136	2.5	17
Chlorobenzene	5000	5270	5180	5220	105	76-131	1.7	15

Category: VOA-MS-TL
Matrix: LEACHATE
QC Lot: 09 DEC 91-LT
Concentration Units: mg/L

1,1-Dichloroethene	0.250	0.250	0.250	0.250	100	56-138	0.0	20
Trichloroethene	0.250	0.255	0.275	0.265	106	76-109	7.5	13
Benzene	0.250	0.288	0.292	0.290	116	78-119	1.4	12
Toluene	0.250	0.261	0.284	0.272	109	82-114	8.4	13
Chlorobenzene	0.250	0.292	0.291	0.292	117	84-117	0.3	10

Category: 8240-SL
Matrix: SOIL
QC Lot: 02 DEC 91-J
Concentration Units: ug/kg

1,1-Dichloroethene	50	47.3	39.9	43.6	87	75-121	17	18
Trichloroethene	50	47.9	43.2	45.6	91	75-108	10	11
Benzene	50	51.4	44.8	48.1	96	81-118	14	15
Toluene	50	51.5	46.9	49.2	98	83-115	9.3	14
Chlorobenzene	50	53.2	54.1	53.6	107	81-115	1.7	14

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: 624-A
Matrix: AQUEOUS
QC Lot: 27 NOV 91-D QC Run: 03 DEC 91-D2
Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	48.1	96	82-112
4-Bromofluorobenzene	50.0	49.3	99	83-113
Toluene-d8	50.0	50.4	101	90-112

Category: 624-A
Matrix: AQUEOUS
QC Lot: 27 NOV 91-D QC Run: 03 DEC 91-D
Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	48.6	97	82-112
4-Bromofluorobenzene	50.0	48.5	97	83-113
Toluene-d8	50.0	50.3	101	90-112

Category: 624-A
Matrix: AQUEOUS
QC Lot: 22 NOV 91-F QC Run: 03 DEC 91-F
Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	48.9	98	82-112
4-Bromofluorobenzene	50.0	49.8	100	83-113
Toluene-d8	50.0	48.7	97	90-112

Category: 624-A
Matrix: AQUEOUS
QC Lot: 03 DEC 91-B QC Run: 04 DEC 91-B2
Concentration Units: ug/L

1,2-Dichloroethane-d4	50.0	44.9	90	82-112
4-Bromofluorobenzene	50.0	50.4	101	83-113
Toluene-d8	50.0	49.6	99	90-112

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: 8240-S
Matrix: SOIL
QC Lot: 27 NOV 91-A QC Run: 27 NOV 91-B
Concentration Units: ug/kg

1,2-Dichloroethane-d4	5000	5080	102	79-126
4-Bromofluorobenzene	5000	5470	109	83-123
Toluene-d8	5000	5310	106	84-128

Category: VOA-MS-TL
Matrix: LEACHATE
QC Lot: 09 DEC 91-LT QC Run: 10 DEC 91-LT
Concentration Units: mg/L

1,2-Dichloroethane-d4	0.250	0.241	96	82-112
4-Bromofluorobenzene	0.250	0.247	99	83-123
Toluene-d8	0.250	0.249	100	84-128

Category: 8240-SL
Matrix: SOIL
QC Lot: 02 DEC 91-J QC Run: 04 DEC 91-J
Concentration Units: ug/kg

1,2-Dichloroethane-d4	50.0	49.4	99	83-113
4-Bromofluorobenzene	50.0	49.8	100	83-113
Toluene-d8	50.0	50.1	100	87-117

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 8240CP-TCL-AP			
Matrix: AQUEOUS			
QC Lot: 20 NOV 91-D QC Run: 03 DEC 91-D			
Acetone	3.3	ug/L	10 J
Benzene	ND	ug/L	5.0
Bromodichloromethane	ND	ug/L	5.0
Bromoform	ND	ug/L	5.0
Bromomethane	ND	ug/L	10
2-Butanone (MEK)	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Chloroethane	ND	ug/L	10
Chloroform	ND	ug/L	5.0
Chloromethane	ND	ug/L	10
Dibromochloromethane	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,2-Dichloroethene	ND	ug/L	5.0
(total)	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
2-Hexanone	ND	ug/L	10
Methylene chloride	1.0	ug/L	5.0 J
4-Methyl-2-pentanone	ND	ug/L	10
(MIBK)	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
1,1,1-Trichloroethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Vinyl acetate	ND	ug/L	10
Vinyl chloride	ND	ug/L	10
Xylenes (total)	ND	ug/L	5.0
Hexane	1.3	ug/L	--
n-Butyl alcohol	ND	ug/L	--
Isobutanol	ND	ug/L	200

Note J : Result is detected below the reporting limit or is an estimated concentration.

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit	
Test: 8240CP-TCL-AP				
Matrix: AQUEOUS				
QC Lot: 27 NOV 91-D QC Run: 03 DEC 91-D2				
Acetone	7.4	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene	ND	ug/L	5.0	
(total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	ND	ug/L	5.0	
4-Methyl-2-pentanone	ND	ug/L	10	
(MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	1.7	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

Note J : Result is detected below the reporting limit or is an estimated concentration.

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit	
Test: 8240CP-TCL-AP				
Matrix: AQUEOUS				
QC Lot: 27 NOV 91-D QC Run: 03 DEC 91-D				
Acetone	3.3	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene	ND	ug/L	5.0	
(total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	1.0	ug/L	5.0	J
4-Methyl-2-pentanone				
(MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	1.3	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

Note J : Result is detected below the reporting limit or is an estimated concentration.

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit	
Test: 8240CP-TCL-AP				
Matrix: AQUEOUS				
QC Lot: 22 NOV 91-F	QC Run: 03 DEC 91-F			
Acetone	6.2	ug/L	10	J
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene	ND	ug/L	5.0	
(total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	3.9	ug/L	5.0	J
4-Methyl-2-pentanone				
(MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	1.3	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

Note J : Result is detected below the reporting limit or is an estimated concentration.

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit	
Test: 8240CP-TCL-AP				
Matrix: AQUEOUS				
QC Lot: 03 DEC 91-B QC Run: 04 DEC 91-B2				
Acetone	ND	ug/L	10	
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene	ND	ug/L	5.0	
(total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	1.3	ug/L	5.0	J
4-Methyl-2-pentanone				
(MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Hexane	ND	ug/L	--	
n-Butyl alcohol	ND	ug/L	--	
Isobutanol	ND	ug/L	200	

Note J : Result is detected below the reporting limit or is an estimated concentration.

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit	
Test: 8240CPM-TCL-S				
Matrix: SOIL				
QC Lot: 27 NOV 91-A QC Run: 27 NOV 91-B				
Acetone	360	ug/kg	1000	J
Benzene	ND	ug/kg	500	
Bromodichloromethane	ND	ug/kg	500	
Bromoform	ND	ug/kg	500	
Bromomethane	ND	ug/kg	1000	
2-Butanone (MEK)	ND	ug/kg	1000	
Carbon disulfide	ND	ug/kg	500	
Carbon tetrachloride	ND	ug/kg	500	
Chlorobenzene	ND	ug/kg	500	
Chloroethane	ND	ug/kg	1000	
Chloroform	ND	ug/kg	500	
Chloromethane	ND	ug/kg	1000	
Dibromochloromethane	ND	ug/kg	500	
1,1-Dichloroethane	ND	ug/kg	500	
1,2-Dichloroethane	ND	ug/kg	500	
1,1-Dichloroethene	ND	ug/kg	500	
1,2-Dichloroethene	ND	ug/kg	500	
(total)	ND	ug/kg	500	
1,2-Dichloropropane	ND	ug/kg	500	
cis-1,3-Dichloropropene	ND	ug/kg	500	
trans-1,3-Dichloropropene	ND	ug/kg	500	
Ethylbenzene	ND	ug/kg	500	
2-Hexanone	ND	ug/kg	1000	
Methylene chloride	260	ug/kg	500	J
4-Methyl-2-pentanone	ND	ug/kg	1000	
(MIBK)	ND	ug/kg	500	
Styrene	ND	ug/kg	500	
1,1,2,2-Tetrachloroethane	ND	ug/kg	500	
Tetrachloroethene	ND	ug/kg	500	
Toluene	ND	ug/kg	500	
1,1,1-Trichloroethane	ND	ug/kg	500	
1,1,2-Trichloroethane	ND	ug/kg	500	
Trichloroethene	ND	ug/kg	500	
Vinyl acetate	ND	ug/kg	1000	
Vinyl chloride	ND	ug/kg	1000	
Xylenes (total)	ND	ug/kg	500	
Hexane	220	ug/kg	--	
n-Butyl alcohol	ND	ug/kg	--	
Isobutanol	ND	ug/kg	20000	

Note J : Result is detected below the reporting limit or is an estimated concentration.

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit
Test: 8240-OTC-TCLP-L			
Matrix: SOIL			
QC Lot: 09 DEC 91-LT QC Run: 10 DEC 91-LT			
Vinyl chloride	ND	mg/L	0.050
1,1-Dichloroethene	ND	mg/L	0.025
Chloroform	ND	mg/L	0.025
1,2-Dichloroethane	ND	mg/L	0.025
2-Butanone	ND	mg/L	0.050
Carbon tetrachloride	ND	mg/L	0.025
Trichloroethene	ND	mg/L	0.025
Benzene	ND	mg/L	0.025
Tetrachloroethene	ND	mg/L	0.025
Chlorobenzene	ND	mg/L	0.025

Test: 8240-OTC-TCLP-L
Matrix: LEACHATE
QC Lot: 09 DEC 91-LT QC Run: 10 DEC 91-LT

Vinyl chloride	ND	mg/L	0.050
1,1-Dichloroethene	ND	mg/L	0.025
Chloroform	ND	mg/L	0.025
1,2-Dichloroethane	ND	mg/L	0.025
2-Butanone	ND	mg/L	0.050
Carbon tetrachloride	ND	mg/L	0.025
Trichloroethene	ND	mg/L	0.025
Benzene	ND	mg/L	0.025
Tetrachloroethene	ND	mg/L	0.025
Chlorobenzene	ND	mg/L	0.025

Test: 8240CPL-TCL-S
Matrix: SOIL
QC Lot: 02 DEC 91-J QC Run: 04 DEC 91-J

Acetone	1.9	ug/kg	10	J
Benzene	ND	ug/kg	5.0	
Bromodichloromethane	ND	ug/kg	5.0	
Bromoform	ND	ug/kg	5.0	
Bromomethane	ND	ug/kg	10	
2-Butanone (MEK)	ND	ug/kg	10	
Carbon disulfide	ND	ug/kg	5.0	
Carbon tetrachloride	ND	ug/kg	5.0	
Chlorobenzene	ND	ug/kg	5.0	

Note J : Result is detected below the reporting limit or is an estimated concentration.

METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Analyte	Result	Units	Reporting Limit	
Test: 8240CPL-TCL-S				
Matrix: SOIL				
QC Lot: 02 DEC 91-J	QC Run: 04 DEC 91-J			
Chloroethane	ND	ug/kg	10	
Chloroform	ND	ug/kg	5.0	
Chloromethane	ND	ug/kg	10	
Dibromochloromethane	ND	ug/kg	5.0	
1,1-Dichloroethane	ND	ug/kg	5.0	
1,2-Dichloroethane	ND	ug/kg	5.0	
1,1-Dichloroethene	ND	ug/kg	5.0	
1,2-Dichloroethene				
(total)	ND	ug/kg	5.0	
1,2-Dichloropropane	ND	ug/kg	5.0	
cis-1,3-Dichloropropene	ND	ug/kg	5.0	
trans-1,3-Dichloropropene	ND	ug/kg	5.0	
Ethylbenzene	ND	ug/kg	5.0	
2-Hexanone	ND	ug/kg	10	
Methylene chloride	1.1	ug/kg	5.0	J
4-Methyl-2-pentanone				
(MIBK)	ND	ug/kg	10	
Styrene	ND	ug/kg	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.0	
Tetrachloroethene	ND	ug/kg	5.0	
Toluene	ND	ug/kg	5.0	
1,1,1-Trichloroethane	ND	ug/kg	5.0	
1,1,2-Trichloroethane	ND	ug/kg	5.0	
Trichloroethene	ND	ug/kg	5.0	
Vinyl acetate	ND	ug/kg	10	
Vinyl chloride	ND	ug/kg	10	
Xylenes (total)	ND	ug/kg	5.0	
Hexane	ND	ug/kg	--	
n-Butyl alcohol	ND	ug/kg	--	
Isobutanol	ND	ug/kg	200	

Note J : Result is detected below the reporting limit or is an estimated concentration.

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
019150-0023-SA	LEACHATE	BNA-TL	07 JAN 92-AT	10 JAN 92-AT
019150-0023-MS	LEACHATE	BNA-TL	03 DEC 91-AT	04 DEC 91-AT

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Spiked	Concentration		AVG	Accuracy		Precision	
		DCS1	Measured DCS2		Average(%) DCS	Limits	(RPD) DCS	Limit
Category: BNA-TL								
Matrix: LEACHATE								
QC Lot: 07 JAN 92-AT								
Concentration Units: mg/L								
Phenol	0.50	0.337	0.286	0.312	62	42-109	16	33
2-Chlorophenol	0.50	0.343	0.320	0.332	66	50-104	6.9	38
1,4-Dichlorobenzene	0.25	0.160	0.162	0.161	64	31-101	1.2	33
N-Nitroso-di-n-propylamine	0.25	0.182	0.182	0.182	73	49-109	0.0	30
1,2,4-Trichlorobenzene	0.25	0.183	0.180	0.182	73	29-100	1.7	33
4-Chloro-3-methylphenol	0.50	0.321	0.327	0.324	65	48-112	1.9	37
Acenaphthene	0.25	0.183	0.180	0.182	73	48- 99	1.7	27
4-Nitrophenol	0.50	0.449	0.425	0.437	87	29-124	5.5	53
2,4-Dinitrotoluene	0.25	0.189	0.186	0.188	75	52-104	1.6	26
Pentachlorophenol	0.50	0.440	0.400	0.420	84	25-132	9.5	49
Pyrene	0.25	0.165	0.168	0.166	67	51-116	1.8	26

Category: BNA-TL
Matrix: LEACHATE
QC Lot: 03 DEC 91-AT
Concentration Units: mg/L

Phenol	0.50	0.348	0.213	0.280	56	42-109	48	33
2-Chlorophenol	0.50	0.325	0.191	0.258	52	50-104	52	38
1,4-Dichlorobenzene	0.25	0.144	0.135	0.140	56	31-101	6.5	33
N-Nitroso-di-n-propylamine	0.25	0.160	0.149	0.154	62	49-109	7.1	30
1,2,4-Trichlorobenzene	0.25	0.145	0.156	0.150	60	29-100	7.3	33
4-Chloro-3-methylphenol	0.50	0.335	0.291	0.313	63	48-112	14	37
Acenaphthene	0.25	0.169	0.157	0.163	65	48- 99	7.4	27
4-Nitrophenol	0.50	0.325	0.266	0.296	59	29-124	20	53
2,4-Dinitrotoluene	0.25	0.158	0.160	0.159	64	52-104	1.3	26
Pentachlorophenol	0.50	0.333	0.260	0.296	59	25-132	25	49
Pyrene	0.25	0.179	0.173	0.176	70	51-116	3.4	26

Calculations are performed before rounding to avoid round-off errors in calculated results.

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Concentration		Accuracy(%)	
	Spiked	Measured	SCS	Limits

Category: BNA-TL
Matrix: LEACHATE
QC Lot: 07 JAN 92-AT QC Run: 10 JAN 92-AT
Concentration Units: mg/L

Nitrobenzene-d5	0.500	0.355	71	44-103
2-Fluorobiphenyl	0.500	0.335	67	41- 99
Terphenyl-d14	0.500	0.258	52	41-126
Phenol-d5	1.00	0.688	69	25-112
2-Fluorophenol	1.00	0.732	73	37-100
2,4,6-Tribromophenol	1.00	0.564	56	40-115

Category: BNA-TL
Matrix: LEACHATE
QC Lot: 03 DEC 91-AT QC Run: 04 DEC 91-AT
Concentration Units: mg/L

Nitrobenzene-d5	0.500	0.320	64	44-103
2-Fluorobiphenyl	0.500	0.296	59	41- 99
Terphenyl-d14	0.500	0.321	64	41-126
Phenol-d5	1.00	0.356	36	25-112
2-Fluorophenol	1.00	0.602	60	37-100
2,4,6-Tribromophenol	1.00	0.591	59	40-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Analyte	Result	Units	Reporting Limit
Test: 8270-OTC-TCLP-L			
Matrix: SOIL			
QC Lot: 07 JAN 92-AT QC Run: 10 JAN 92-AT			
Pyridine	ND	mg/L	0.10
1,4-Dichlorobenzene	ND	mg/L	0.050
2-Methylphenol	ND	mg/L	0.050
3/4-Methylphenol	ND	mg/L	0.050
Hexachloroethane	ND	mg/L	0.050
Nitrobenzene	ND	mg/L	0.050
Hexachlorobutadiene	ND	mg/L	0.050
2,4,6-Trichlorophenol	ND	mg/L	0.050
2,4,5-Trichlorophenol	ND	mg/L	0.25
2,4-Dinitrotoluene	ND	mg/L	0.050
Hexachlorobenzene	ND	mg/L	0.050
Pentachlorophenol	ND	mg/L	0.25

Test: 8270-OTC-TCLP-L
Matrix: SOIL
QC Lot: 03 DEC 91-AT QC Run: 04 DEC 91-AT

Pyridine	ND	mg/L	0.10
1,4-Dichlorobenzene	ND	mg/L	0.050
2-Methylphenol	ND	mg/L	0.050
3/4-Methylphenol	ND	mg/L	0.050
Hexachloroethane	ND	mg/L	0.050
Nitrobenzene	ND	mg/L	0.050
Hexachlorobutadiene	ND	mg/L	0.050
2,4,6-Trichlorophenol	ND	mg/L	0.050
2,4,5-Trichlorophenol	ND	mg/L	0.25
2,4-Dinitrotoluene	ND	mg/L	0.050
Hexachlorobenzene	ND	mg/L	0.050
Pentachlorophenol	ND	mg/L	0.25

MATRIX SPECIFIC QC
ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

QC SAMPLE TYPE	TEST	LABORATORY SAMPLE NUMBER	QC LOT
MATRIX SPIKE	8270-OTC-TCLP-L	019150-0023-MS	03 DEC 91-AT

MATRIX SPIKE REPORT
 Semivolatile Organics by GC/MS

Analyte	Sample	Concentration Matrix Spike	Amount Spiked	% Rec
Test: 8270-OTC-TCLP-L				
Matrix AQUEOUS				
Sample: 019150-0023				
Units: mg/L				
Pyridine	ND	0.29	0.50	57
1,4-Dichlorobenzene	ND	0.30	0.50	61
2-Methylphenol	ND	0.22	0.50	44
3/4-Methylphenol	ND	0.39	1.0	39
Hexachloroethane	ND	0.31	0.50	62
Nitrobenzene	ND	0.35	0.50	69
Hexachlorobutadiene	ND	0.31	0.50	61
2,4,6-Trichlorophenol	ND	0.27	0.50	54
2,4,5-Trichlorophenol	ND	0.26	0.50	51
2,4-Dinitrotoluene	ND	0.42	0.50	83
Hexachlorobenzene	ND	0.33	0.50	65
Pentachlorophenol	ND	0.34	0.50	68

ND = Not detected

NC = Not calculated, calculation not applicable

All results and spike amounts are reported on a dry weight basis.

All calculations are performed before rounding to avoid round-off errors in calculated results.

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
019150-0023-SA	AQUEOUS	PH-A	10 DEC 91-S	-
019150-0023-SA	SOIL	CNR-S	06 DEC 91-A	06 DEC 91-A
019150-0023-SA	SOIL	SR-S	06 DEC 91-A	06 DEC 91-A
019150-0023-SA	SOIL	TOX-S	26 DEC 91-Q	-
019150-0023-SA	SOIL	PHEN-S	03 DEC 91-A	03 DEC 91-A

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration		Measured DCS2	AVG	Accuracy Average(%)		Precision (RPD)	
	Spiked	DCS1			DCS	Limits	DCS	Limit
Category: PH-A Matrix: AQUEOUS QC Lot: 10 DEC 91-S Concentration Units: units								
pH	9.1	9.20	9.23	9.22	101	98-102	0.3	5
Category: CNR-S Matrix: SOIL QC Lot: 06 DEC 91-A Concentration Units: mg/kg								
Cyanide, Reactive	100	20.1	14.2	17.2	17	0-100	34	200
Category: SR-S Matrix: SOIL QC Lot: 06 DEC 91-A Concentration Units: mg/kg								
Sulfide, Reactive	99.6	44.1	39.9	42.0	42	0-200	10	200
Category: TOX-S Matrix: SOIL QC Lot: 26 DEC 91-Q Concentration Units: mg/kg								
Total Organic Halogen as Cl	1.0	1.01	0.994	1.00	100	75-125	1.6	20
Category: PHEN-S Matrix: SOIL QC Lot: 03 DEC 91-A Concentration Units: mg/kg								
Phenolics	10.0	8.24	9.76	9.00	90	75-125	17	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: CNREAC-TEC-S Matrix: SOIL QC Lot: 06 DEC 91-A QC Run: 06 DEC 91-A			
Cyanide, Reactive	ND	mg/kg	0.10
Test: SREAC-SPEC-S Matrix: SOIL QC Lot: 06 DEC 91-A QC Run: 06 DEC 91-A			
Sulfide, Reactive	ND	mg/kg	0.50
Test: PHEN-SPEC-S Matrix: SOIL QC Lot: 03 DEC 91-A QC Run: 03 DEC 91-A			
Phenolics	ND	mg/kg	1.0



Appendix

CHAIN OF CUSTODY

ENSECO CLIENT
 Woodward-Clyde Consultants
 PROJECT
 91C7343.0130 UTAS, Keokuk
 SAMPLING COMPANY
 WCC
 SAMPLING SITE
 UTA/Schlegel Plant, Keokuk, IA
 TEAM LEADER
 David Dads

SAMPLE SAFE™ CONDITIONS	
PACKED BY	SEAL NUMBER
SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY	CONDITION OF CONTENTS
SEALED FOR SHIPPING BY	INITIAL CONTENTS TEMP. °C
SEAL NUMBER	SAMPLING STATUS <input type="checkbox"/> Done <input type="checkbox"/> Continuing Until
SEAL INTACT UPON RECEIPT BY LAB. <input type="checkbox"/> Yes <input type="checkbox"/> No	CONTENTS TEMPERATURE UPON RECEIPT BY LAB °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
11/20/91	—	Trip blank	Ground Water	3-40 ml VOA	8240 VOA ^s (TCH plus MiBK,	
	1630	mw-1			n-hexane and butanol)	
	1200	mw-2				X
	1520	mw-3				Note holding times -
	1620	mw-4				Samples were
	1115	mw-5				collected 12/20
	1140	mw-6A				11/20/91
	1605	mw-6B				Also - mw-1, mw-2,
	1540	mw-7				mw-4 - very high
	1550	mw-8				solvent concentrations expected (1000 [±] mg/l)

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
David D. Dads		11/21/91	1420

SHIPPING DETAILS

DELIVERED TO SHIPPER BY	
METHOD OF SHIPMENT	AIRBILL NUMBER
RECEIVED FOR LAB RMAL	SIGNED [Signature]
ENSECO PROJECT NUMBER 19150	DATE/TIME 11-22-91 0800

CHAIN OF CUSTODY

ENSECO CLIENT Woodward-Clyde Consultants
 PROJECT 91C7343.0130 UTAS, Keokuk
 SAMPLING COMPANY WCC
 SAMPLING SITE UTA/schlegel Plant, Keokuk, IA
 TEAM LEADER David Dods

SAMPLE SAFE™ CONDITIONS	
PACKED BY	SEAL NUMBER
SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY	CONDITION OF CONTENTS
SEALED FOR SHIPPING BY	INITIAL CONTENTS TEMP. °C
SEAL NUMBER	SAMPLING STATUS <input type="checkbox"/> Done <input type="checkbox"/> Continuing Until
SEAL INTACT UPON RECEIPT BY LAB. <input type="checkbox"/> Yes <input type="checkbox"/> No	CONTENTS TEMPERATURE UPON RECEIPT BY LAB. °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
11/20/91	1510	mw-9 ✓	Ground water	3-40ml VOA's	8240 VOA's (TCL plus MiBK,	
	1430	mw-10 ✓			n-hexane, and butanol)	
	1430	mw-10 D ✓				
	1445	mw-11 ✓				* Note holding
	1235	mw-12 ✓				times - samples
	1235	mw-12 D ✓				were collected
	1020	mw-13 ✓				Wed. 11/20/91 ✗
	1050	mw-14 ✓				
	1035	mw-15 ✓				
↓			↓	↓		

CUSTODY TRANSFERS PRIOR TO SHIPPING				SHIPPING DETAILS	
RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME	DELIVERED TO SHIPPER BY	
<u>David A. Dods</u>		11/21/91	1420		
				METHOD OF SHIPMENT	AIRBILL NUMBER
				RECEIVED FOR LAB	SIGNED
				<u>RMAC</u>	<u>Alan Patis</u>
				ENSECO PROJECT NUMBER	DATE/TIME
				<u>19150</u>	<u>11-22-91 0800</u>